# RAILROAD GAZETTE

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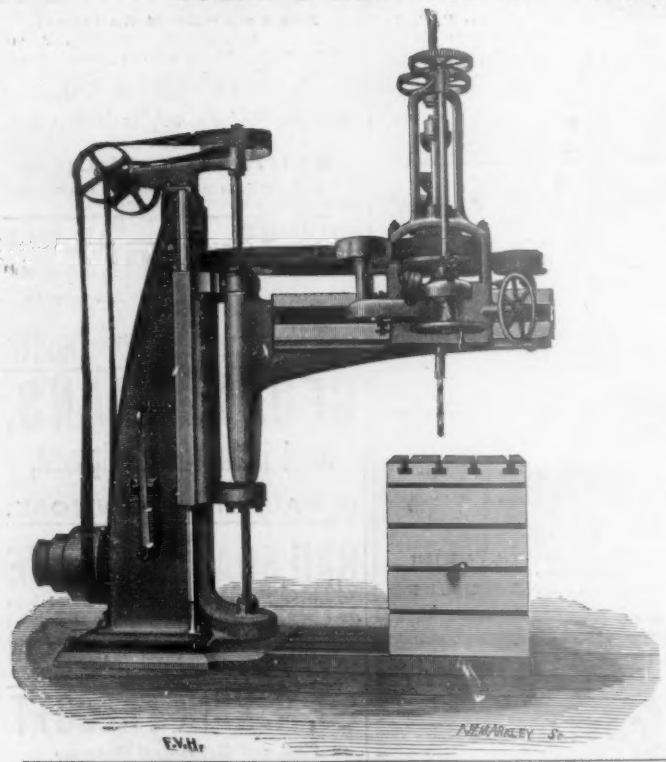

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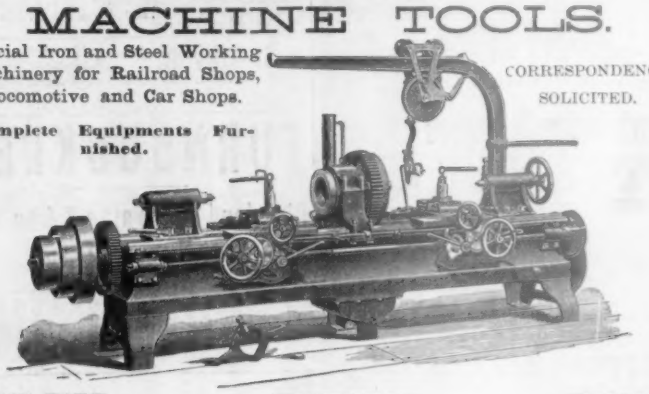

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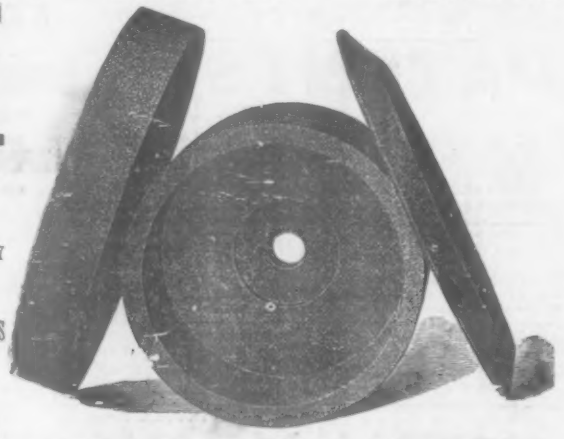

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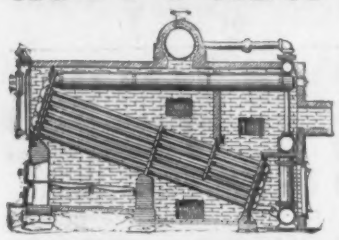

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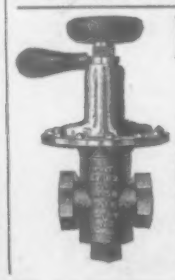

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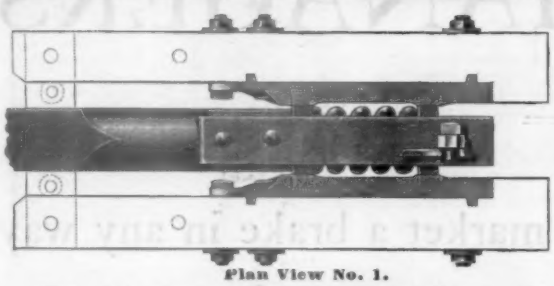

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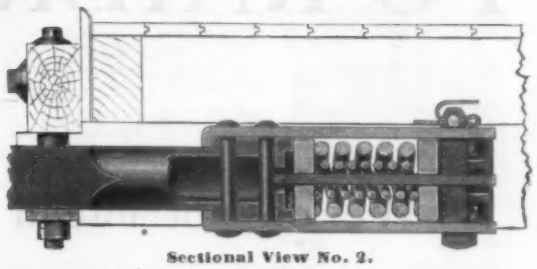
Perspective.



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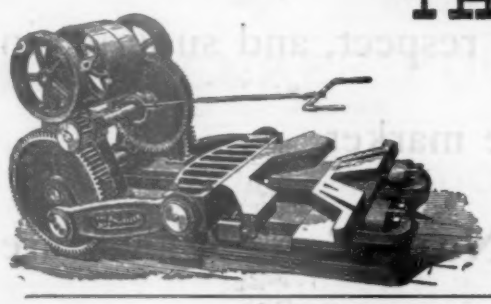

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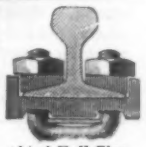

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Fitchburg R. R. 15
Fitzgerald, S. C. 1
Flagg, Stanley G. & Co. 7
Flood & Conklin Co. 13
Fontaine Crossing Co. 33
Foos Mfg. Co. 15
Fowler, Geo. L. 13
French Spring Co., A. 18
Frescoln, S. W. 36
Fuller Bros. & Co. 34
Gardner, O. K. 1
Gates Iron Wks. 15
Gilbert, Bradford L. 1
Gill-Alexander El. Mfg. Co. 21
Gold Car Heating Co. 15, 25
Goodwin, J. B. 6
Gould Coupler Co. 28
Gould & Eberhardt 9
Gouids Mfg. Co 21
Greenlee Bros. & Co. 8
Guarantee Co., N. A. 9
Hale & Kilburn Mfg. Co. 27
Hall Signal Co. 19-20
Halsey, Jas. T. 21
Hammett, M. C. 34
Harrington, Edw., Son & Co. 3
Hartford Steam Boiler I. & I. Co. 17
Hartford Woven Wire Mat. Co. 16
Harvey Steel Car Co. 26
Hayes Tool Co. 13
Heller & Brightly 13
Hendricks Bros. 25
Hildreth, R. W. & Co. 13
Hinckley Brake Co. 32
Hinson Car Coupler Co. 28
Hinson Draw Bar Attach 3
Hoosac Tunnel Route 33
Hope & Co 34
Hopkins, D. A., Mfg. Co. 13
Howard Iron Wks. 1
Howson & Howson 1
Hughs, John 11
Humphreys & Sayce 13
Hunt, C. W. Co. 15
Hunt, Robt. W. & Co., The 1
Hutchins, C. B., & Sons 1
Illinois Central R. R. 33
Illinois Steel Co. 18
Industrial Works 17
Ingersoll-Sargent Drill Co. 17
Jackson & Sharp Co. 36
Jackson & Woodin Mfg. Co. 27
Jersey City Wheel Fdy. & M. Co. 32
Johns, H. W., Mfg. Co. 22
Johnson Railroad Signal Co 1
Johnston Car Coupling Co. 20
Johnston R. R., Fr. & S. Co. 1
Jones, B. M., & Co. 1
Jull Mfg. Co. 35
Kalamazoo R. R. Velocipede & Car Co. 11
Kan. City, Ft. Sc. & Mem. R. R. 12
Ketcham, C. F., & Co. 5
Keuffel & Esser Co. 1
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King Bridge Co. 36
Kinsman Block System Co. 31
Knitted Mattress Co. 40
Laidlaw & Dunn Co. 31
L. S. & M. S. R. R. 38
Latrobe Steel Works 31
Lee Composite Mfg. Co. 23
Lehigh Val. Creosot'g Wks. 33
Lehigh Valley R. R. 40
Lidgerwood Mfg. Co. 2
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Lodbell Car Wheel Co. 31
Long & Allstatter Co. 8
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Louisv. Car Wh'l Ry. Sup. Co. 22
Louisville Steam Forge Co 1
Lucius, Albert 1
Lukens Iron & Steel Co. 18
Males, A. S. & Co. 13
Manning, Maxwell & Moore 8
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Martin Anti-Fire Car Heat. Co. 25
Mason Regulator Co 22
McClure, Alex. 37
McCoy Co., Jos. F. 9
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McSherry Mfg. Co. 1
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Merrill-Stevens Co. 11
Metcalf, Paul & Co. 18
Michigan Central Ry. 33
Michigan Forge & Iron Co. 18
Middleton, W. S. 13
Middletown Car Works 27
Midvale Steel Co. 31
Missouri, Kansas & Texas Ry. 12
Missouri Pacific Ry 39
Mo. Vy. Bridge & Iron Wks. 39
Moran Flexible Steam Joint Co. 7
Morse Twist Drill & Mach. Co. 8
Morton Safety Heating 24
Mt. Vernon Bridge Co. 40
Mosier Safety Signal Co. 21
Mundy, J. S. 11
Murphy Varnish Co. 22
Nathan Mfg. Co. 40
Natl. Electric Headlight Co. 10
Natl. Hollow Brake Beam Co. 40
National Lock Washer Co. 34
Natl. Malleable Castings Co. 27
National Paint Works 38
National Switch & Signal Co. 3
Newark Mach. Tool Wks 40
New Jersey St. & Ir. Co. 39
N. Y. Air Brake Co. 4
N. Y. Belting & Packing Co., Ltd. 16
N. Y. Car Wheel Wks 40
N. Y. C. & H. R. R. R. 38
N. Y. Equipment Co 1
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N. Y. & New England R. R. 36
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Northampton Emery Wheel Co. 2
Northw'n Equipment Co. 40
Okonite Co., Ltd. 16
Osgood Dredge Co. 17
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Parsons, W. E. 1
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Pedrick & Ayer 9
Pennell, Arthur 1
Pennsylvania R. R. 35
Pennsylvania Steel Co., N. Y. 1
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Perry & Co., W. H. 13
Peters G. D. & Co. 1
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Phœnix Bridge Co. 37
Phosph. Re'se Smelt. Co., Ltd. 6
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Schuttler Mfg. Co. 6
Scott Spring Co., Chas. 37
Sellers, Morris & Co. 10
Sellers, Wm. & Co. 2
Shaller & Schnigian 37
Sharon Steel Casting Co. 40
Sheffield Velocipede Car Co. 40
Shiffler Bridge Co 37
Shoemaker, A. T. 13
Shoenberger & Co. 18
Shoulder Tie Plate Co. 5
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Smiths Coupler & Mfg. Co. 28
Smith, Edw., & Co 22
Smith, F. H. 13
Solid Steel Co. 31
Sooysmith & Co. 39
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Souther, Jno., & Co. 17
South'n & Pac. Refrig. Car Co. 36
Spon, E. & F. N., & Co. 1
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Standard Car Coup Co. 28
Standard Nut Lock Co 34
Standard Paint Co. 5
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Standard Thermometer Co. 25
Stiles & Parker Press Co. 9
Stonington Line 6
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Stow Mfg Co. 21
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E. N. Kirk Talcott 1
Tanite Co. 40
Taylor Iron & Steel Co. 31
Texas & Pacific 13
Thomson, J. L., Mfg. Co. 6
Trautwine, Jno. C., Jr. 32
Trenton Iron Co 3
Trojan Car Coupler Co. 26
Union Bridge Co. 37
Union Iron Works. 18
Union Switch & Signal Co. 1
U. S. Metallic Packing Co. 34
Universal Radial Drill Co 1
Valle & Young 13
Van Dorston Cushioned Car Coup. Equip. Co. 27
Von Schon & Garner 13
Vulcan Iron Works (Chicago) 17
Vulcan Iron Works (Toledo) 17
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Wagner Car Door 24
Wallis Iron Works. 39
Wants and For Sale 13
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Wason Mfg. Co. 30
Watson & Stillman 9
Webb Pavement Co. 32
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White, Jno. A., Co. 5
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Whiton, A. S. 1
Whittlesey, Geo. P 1
Williams, White & Co. 3
Wilson Bros. & Co. 1
Wilson, Jas. G. 40
Wisconsin Central R. R. 39
Wolhaupter, Benj. 1
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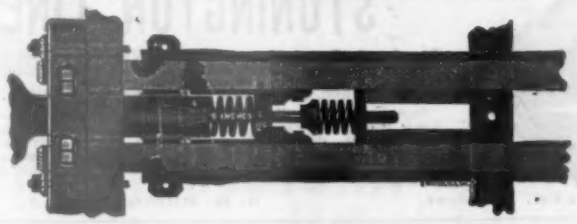

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New York Equip. Co., 15 Wall St., N. Y.
**Freight Conveyors**
Industrial Works, Bay City, Mich.
**Forges**
The Foos Mfg. Co., Springfield, O.
**Furnaces**
Abendroth & Root M. Co., 28 Cliff St., N.Y.
**Frogs and Crossings**
Allentown Rolling Mill, Allentown, Pa.
Cleveland (O.) Frog & Crossing Co.
Elliott Frog & Sw. Co., E. St. Louis, Ill.
Johnston R. R. Frog & Switch Co., Phila.
Pennsylvania Steel Co., Steelton, Pa.
Ramapo Iron Works, Hillburn, N. Y.
Union Switch & Signal Co., Pittsburgh.
Weir Frog Co., Cincinnati, O.
**Gauges (Pressure)**
Ashcroft Mfg. Co., 111 Liberty St., N. Y.
**Grader, Ditcher & R. R. Builder**
F. C. Austin Mfg. Co., Chicago, Ill
**Guarantee Co.**
Guarantee Co. of N. A., Montreal.
**Hand Cars**
The Buda Fdy & Mfg. Co., Harvey, Ill.
Fairbanks, Morse & Co., Chicago.
Kalamazoo (Mich.) R. R. Veloc. Co.
Sheffield Velocipede Car Co., Three Rivers, Mich.
**Harbor Works**
S. W. Frescoln, World Bldg., N. Y.
**Highway Crossing Signals**
Electric Supply & Mfg. Co., Clevel'd, O.
**Hoisting & Conveying Machinery**
Brown Hoisting & Conveying Mach. Co. Cleveland, O.
C. W. Hunt Co., 45 B'way, New York.
King Bridge Co., Cleveland, O.
Lidgerwood Mfg. Co., 96 Lib'ty S.t., N.Y.
**Hoisting Engines**
Copeland & Bacon, New York City.
Industrial Works, Bay City, Mich.
Lidgerwood Mfg. Co., 96 Liberty St., N.Y.
Joseph F. McCoy Co., 26 Warren St., N.Y.
Watson & Stillman, 210 E. 43d St., N. Y.
**Hydraulic Machinery**
Tinius Olsen & Co., Philadelphia, Pa.
Union Iron Works, San Francisco.
Watson & Stillman, N. Y. City.
R. D. Wood & Co., Philadelphia, Pa.
**Injectors**
Nathan Mfg. Co., 94 Liberty street, N. Y.
Wm. Sellers & Co., Philadelphia.
**Inspectors**
Pittsb. Test. Laboratory, Pittsb., Pa.
**Inspectors of Bridges and Ry. Equipment**
R. W. Hildreth & Co., 2 Wall St., N. Y.
**Insurance**
Hart. S. Boiler Insp. & Ins. Co., Hartford
Royal Ins. Co., 50 Wall street, N. Y.
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Allentown Rolling Mills, Allentown, Pa.
Hall Signal Co., 50 B'way, N. Y.
Kelsey R. R. Signal Co., Florence, Mass.
Nat. Switch & Signal Co., So. Bethlehem, Pa.
Union Switch & Signal Co., Pittsburgh.
Wharton R. R. Switch Co., Phila.
**Iron—Taylor Yorkshire**
B. M. Jones & Co., Boston, Mass.
**Iron Work for Contractors**
Edge Moor Bridge Wks, Wilmington, Del.
King Bridge Co., Cleveland, O.
**Iron & Steel Ship Builders**
Union Iron Works, San Francisco.
**Jacks**
Fairbanks, Morse & Co., Chicago.
McSherry Mfg. Co., Dayton, O.
Richard Dudgeon, 24 Columbia St., N. Y
Watson & Stillman, 210 E. 43d St., N. Y.
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Ajax Metal Co., Philadelphia, Pa.
D. A. Hopkins Mfg. Co., 143 Liberty St. N.Y.
Phosphor-Bronze Smelting Co., Philada.
Paul S. Reeves, Philadelphia, Pa.
**Journal Bearings—Tubular**
Meneely Bearing Co., W. Troy, N. Y.
**Journal-Box Lids**
Ramapo (N. Y.) Wheel & F'dry Co.
**Lighting**
Adams & Westlake Co., Chicago.
Railroad Lighting & Mfg. Co., Phila., Pa.
Safety Car Heat. & Light. Co., 160 B'way.
**Link Belting**
Link Belt Eng. Co., Nicetown, Phila.


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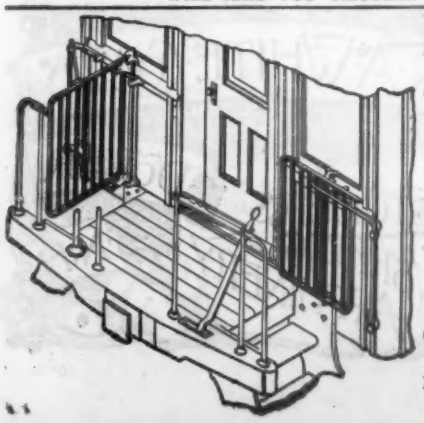

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Ready for immediate use. Requires no washer. Can be made tight with but little pressure.

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Brooks Locomotive W'ks, Dunkirk, N.Y
Cooke Loco. & Mach. Co., Paterson, N.J.
Dickson Mfg. Co., Scranton, Pa.
G. L. Fowler, 53 Broadway, N. Y.
Lima Machine Works, Lima, O.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.
Pittsburgh Loco. & Car W'ks, Pittsburgh.
H. K. Porter & Co., Pittsburgh, Pa.
Portland Co., Portland, Me.
Richmond (Va.) Loco. & Mach. Works.
Rogers Loc. & Mach. Wks., Paterson, N. J.
Schenectady (N. Y.) Loco. Works.
Taite & Carlton, London, Eng.
Wharton R. R. Switch Co., Phila.
**Locomotive Boiler Tubes.**
Allison Mfg. Co., Philadelphia, Pa.
**Locomotive Finishing Varnish**
Flood & Conklin, Newark, N. J.
**Locomotive Headlights**
Adams & Westlake Co., Chicago.
Nat. Elect. Headlight Co., Indianapolis.
**Locomotives, Second-Hand**
Reginald Canning & Co., 115 B'way, N.Y.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.
**Locomotive Staybolt Iron**
Falls Hollow Staybolt Co., Cuyahoga Falls, O.
**Lubricators**
Detroit Lubricator Co., Detroit, Mich.
Nathan Mfg. Co., 92 Liberty street, N. Y.
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Acme Machy. Co., Cleveland, O.
Bement, Miles & Co., Philadelphia, Pa.
Billings & Spencer Co., Hartford, Conn.
E. W. Bliss Co., Brooklyn, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ferracute Machine Co., Bridgeton, N. J.
Gould & Eberhardt, Newark, N. J.
Edw. Harrington, Son & Co., Phila.
Hayes Tool Co., Portland, Me.
Long & Allstatter Co., Hamilton, O.
Manning, Max. & Moore, 111 Liberty St.
Morse Tw. Dr. & Mach. Co., N. Bed'd, Mass.
Newark Mach. Tool Wks., Newark, N. J.
Niles Tools Works, Hamilton, O.
Vedrick & Ayer, Philadelphia, Pa.
Geo. Place, 120 Broadway, N. Y.
D. Saunders' Sons, Yonkers, N. Y.
Wm. Sellers & Co., Philadelphia.
Stiles & Parker Press Co., Middletown, Conn.
Stow Flexible Shaft Co., Phila., Pa.
Stow Mfg. Co., Binghamton, N. Y.
Universal Radial Drill Co., Cincinnati.
Watson & Stillman, 240 E. 43d St., N. Y.
Wharton R. R. Switch Co., Phila.
**Malleable Iron Castings.**
National Malleable Castings Co., Cleveland.
**Mandrel Rolled Staybolt Iron**
Falls Hollow Staybolt Co., Cuyahoga Falls, O.
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Lidgerwood Mfg. Co., 96 Liberty St., N.Y.
Union Iron Works, San Francisco.
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Amer. Washer & Mfg. Co., Newark, N. J.
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National Lock Washer Co., Newark.
Ruffner & Dunn, Philadelphia, Pa.
Standard Nut Lock Co., N. Y.
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**Oil Cans**
Adams & Westlake Co., Chicago.

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Lidgerwood Mfg. Co., 96 Liberty St., N.Y.
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H. W. Johns Mfg. Co., N. Y. City.
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U. S. Metallic Packing Co., Phila.
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Jos. Dixon Crucible Co., Jersey City, N. J.
Nat. Paint Works, Williamsport, Pa.
Standard Paint Co., 2 Liberty St., N. Y.
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S. C. Fitzgerald, Washington, D. C.
Howson & Howson, 119 So. 4th St., Phila.
Geo. P. Whittlesey, Washington, D. C.
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Paul S. Reeves, Philadelphia.
Phosphor-Bronze Smelting Co., Phila.
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Lidgerwood Mfg. Co., 96 Liberty St., N. Y.
Vulcan Iron Works, Chicago, Ill.
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D. Saunders' Sons, Yonkers, N. Y.
**Pneumatic Foundations**
S. W. Frescoln, World Bldg., N. Y.
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Frank Reed, Worcester, Mass.
Stow Flexible Shaft Co., Phila., Pa.
Stow Mfg. Co., Binghamton, N. Y.
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Schoen Mfg. Co., Pittsburgh, Pa.
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Laidlaw & Dunn Co., Cincinnati, O.
R. D. Wood & Co., Philadelphia, Pa.
H. R. Worthington, 86 Liberty St., N. Y.
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J. T. Connelly, Milton, Pa.
**Rails**
Bethlehem Iron Co., 90 Broadway, N. Y.
Cambria Iron Co., Johnstown, Pa.
Geo. A. Evans, 40 and 42 Wall St., N. Y.
Humphreys & Sayce, 10 Wall St., N. Y.
Illinois Steel Co., Chicago, Ill.
A. S. Males & Co., Cincinnati.
N. Y. Equipment Co., 15 Wall St., N. Y.
Pennsylvania Steel Co., 2 Wall St., N. Y.
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**Rail Fastenings**
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National Lock Washer Co., Newark, N. J.
N. Y. Equipment Co., 15 Wall St., N. Y.
Morris Sellers & Co., Chicago.
Ruffner & Dunn, Philadelphia, Pa.
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Eno Rail Joint Co., Newark, N. J.
Fisher Rail Joint Works, Trenton, N. J.
A. S. Males & Co., Cincinnati, O.
McConway & Torley Co., Pittsburgh, Pa.
Pennsylvania Steel Co., Steelton, Pa.
Q. & C. Co., Chicago, Ill.
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Chicago & Alton.
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Lehigh Valley R. R.
Michigan Central.
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New York & New England R. R.
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Stonington Line.
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E. S. Greeley & Co., 7 Dey St., N. Y.
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N. Y. Equipment Co., 15 Wall St., N. Y.
G. D. Peters & Co., London, England.
A. T. Shoemaker, Chicago and N. Y.
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Curtis Regul. Co., 89 Beverly St., Boston.
Mason Regulator Co., Boston, Mass.
**Refined Iron**
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**Refrigerator Cars**
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R. D. Wood & Co., Philadelphia, Pa.
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**Signals, Rail Signal Co., 50 Broadway, N. Y.**
Johnson R. R. Signal Co., Rahway, N. J.
Kinsman Bl'k System Co., 143 Liberty St.
Mozier Safety Signal Co., Galion, O.
Nat. Switch & Sig Co., So. Bethlehem, Pa
Union Switch & Signal Co., Pittsburgh
**Skylights**
Valle & Young, 309 No. St., Baltimore, Md
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Boyer Speed Recorder Co., Chicago.
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Q. & C. Co., Chicago.
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Farist Steel Co., Bridgeport, Conn.
A. French Spring Co., Pittsburgh, Pa.
Pickering Spring Co., Philadelphia.
Chas. Scott Spring Co., Philadelphia, Pa.
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Eureka Cast Steel Co., Philad'a, Pa.
Norristown Steel Co., Norristown, Pa.
Sharon Steel Castings Co., Sharon, Pa.
Solid Steel Co., Alliance, O.
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Standard Steel Works, Philadelphia, Pa.
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Allentown Rolling Mill, Allentown, Pa.
Barnum & Richardson Mfg. Co., Chicago
Elliott Frog & Switch Co., St. Louis, Ill.
Johnston R. R. Frog & Switch Co.
Kelsey R. R. Signal Co., Florence, Mass.
Nat. Switch & Sig. Co., So. Bethlehem, Pa
Pennsylvania Steel Co., Steelton, Pa.
Ramapo Iron Works, Ramapo, N. Y.
Sheffield Veloc. Car Co., Three Rivers, Mich.
Union Switch & Sig. Co., Pittsburgh, Pa.
Weir Frog Co., Cincinnati, O.

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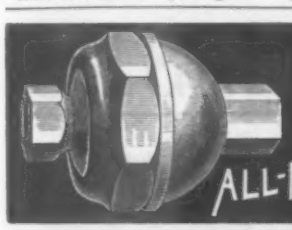

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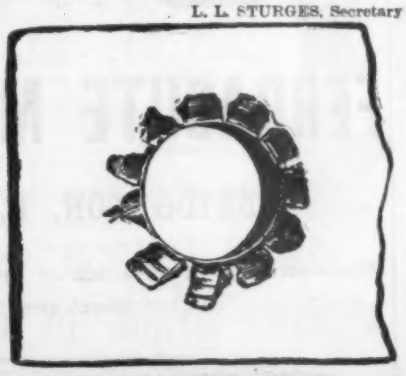
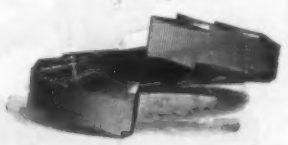
HENRY U. FRANKEL, President, 149 Third St, Louisville, Ky.
ALL-METAL REVERSIBLE PISTON COUPLING · NO HOSE · NO SPRINGS · USED IN CONNECTION WITH FLEXIBLE BALL JOINTS FOR CONVEYING STEAM FROM COACH TO COACH
Applicable to EVERY SYSTEM of STEAM HEATING
BLUE PRINTS AND APPLICATION

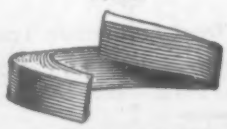
THE AMERICAN WASHER & MANUFACTURING CO.,
13 & 15 RAILROAD PLACE, NEWARK, N. J.
EDWIN W. HINE, President. L. L. STURGES, Secretary and Treasurer. H. A. HARVEY, Vice-President.

The American Harvey No. 1 Nut Lock, a resilient spring washer with chisel cutting edges. Patented. Tempered in oil.



THE AMERICAN "HARVEY RIBBED" NUT LOCK.
A Resilient Spiral Spring Washer with Rachet-Shaped Teeth.

Patented.


SQUARE.

The American "No. 2 Square" Plain Spring, answers the purpose of all ordinary spring washers. Above pattern made of either round or square steel. Tempered in oil.

Our claim for this lock, aside from the unexcelled spring quality it possesses (being tempered in oil) is the tangential cutting or ratchet ribs on either side, and reversed, so that when the nut is set down these ribs are embedded in both fish plate and under face of nut to such extent that a removal of the nut by force (and it can only be done with force) will show annular grooves plowed on surface of both nut and fish plate (see cuts above) without disturbing the thread of either nut or bolt, both of which, together with the nut lock, can be used again. This is a positive lock, with spring temper, and will not cut thread of nut or bolt.

CORRESPONDENCE AND ORDERS SOLICITED. SAMPLES FURNISHED FREE ON APPLICATION AND SENT TO ANY ADDRESS.

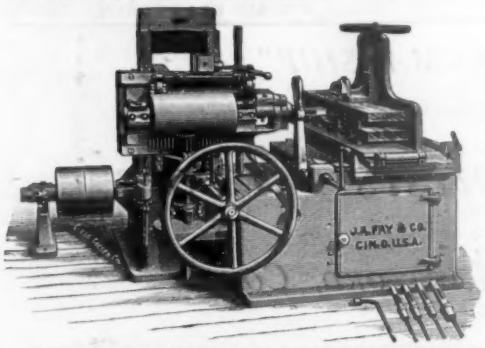
W. H. DOANE, Prest. D. L. LYON, Sec'y.

**J. A. FAY & CO.,**

CINCINNATI, O., U. S. A.

—CAN FURNISH—

**Car, Locomotive and Railway Shops**



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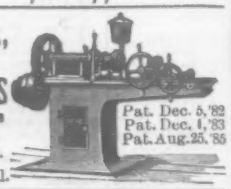

Pat. Dec. 5, '82
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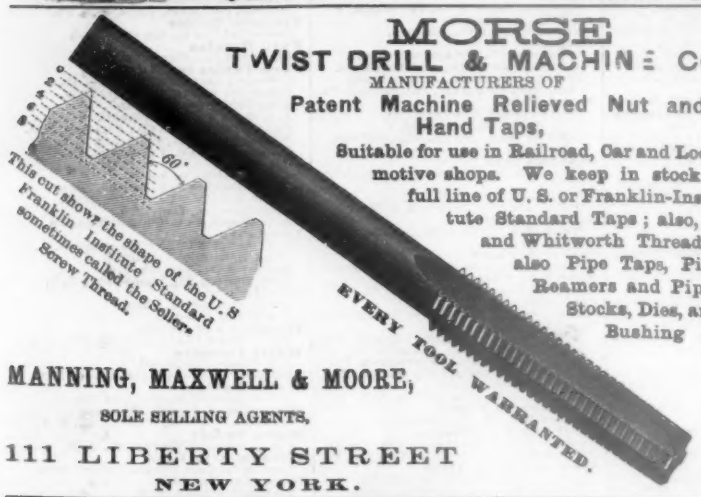
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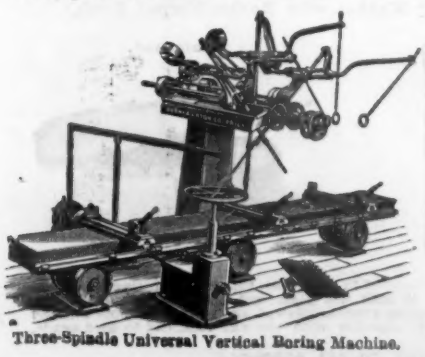

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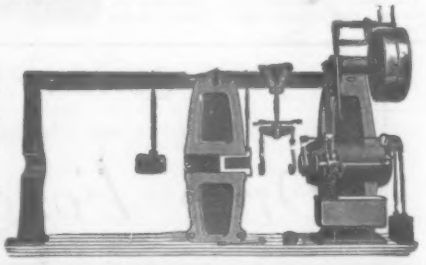

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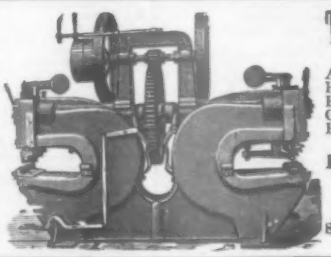

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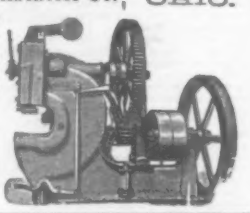

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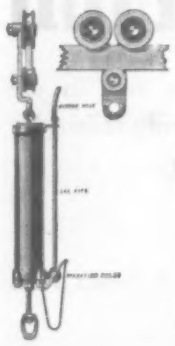

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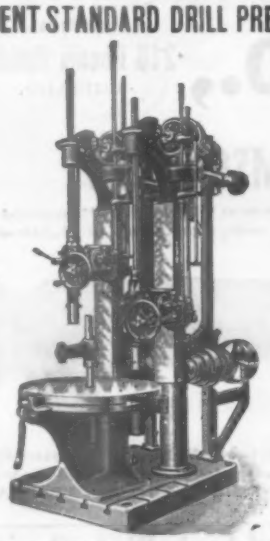

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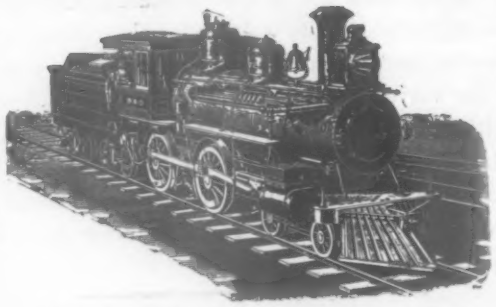

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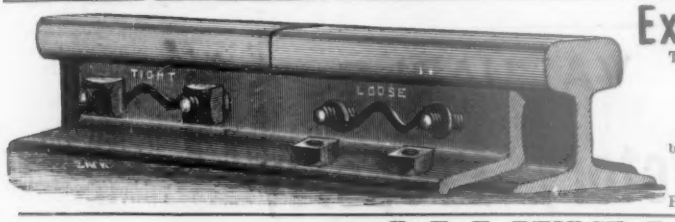


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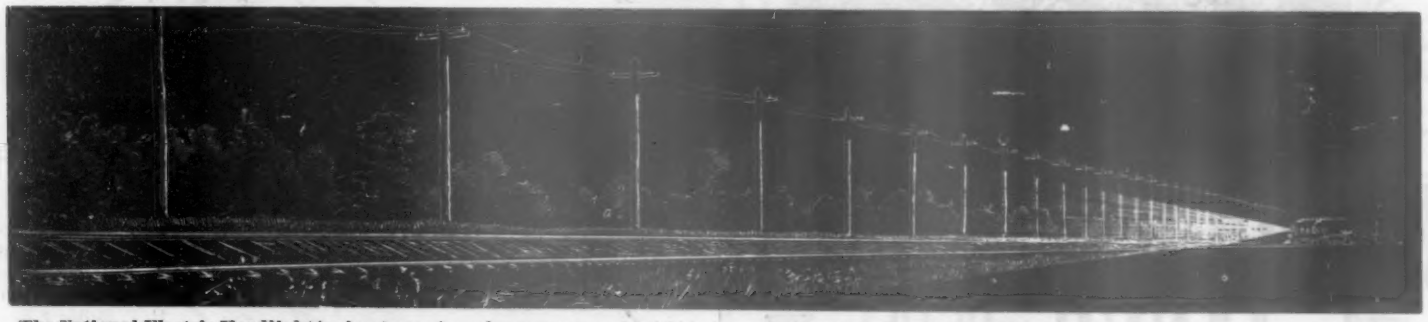

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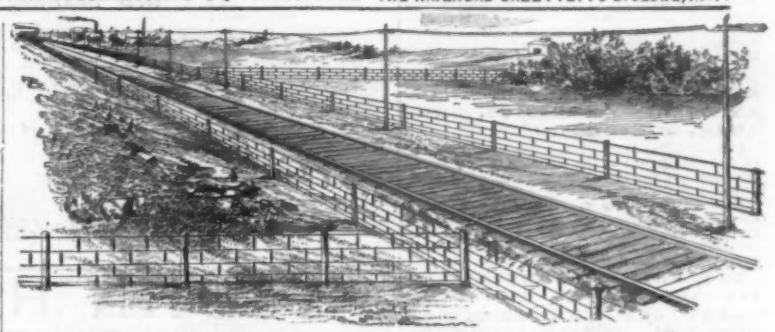

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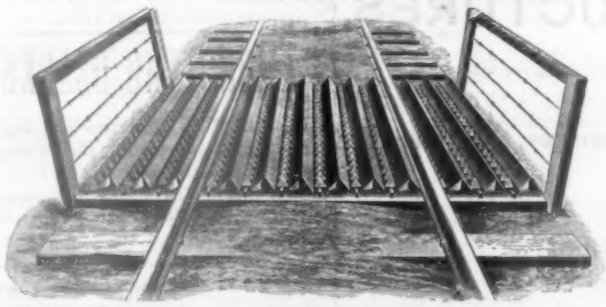

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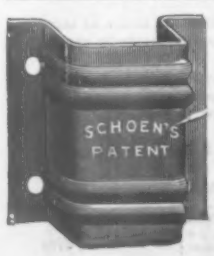


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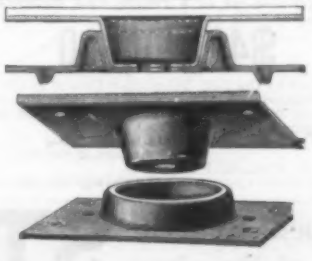

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P. O. Box 346. No. 95 Milk St. Boston, July 1, 1892.

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**TO ENABLE THE COMPANY AND ITS AGENCIES TO PROMPTLY CARRY OUT THE EXCHANGE OFFERED HEREIN, HOLDERS SHOULD DEPOSIT THEIR INCOME BONDS BEFORE JULY 15, 1892.**

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GEORGE C. MAGOUN, *Chairman.*
J. W. REINHART, *Vice-President.*

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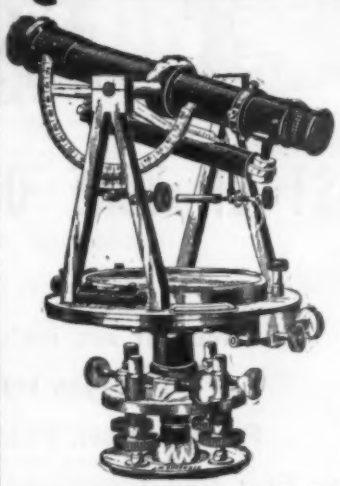

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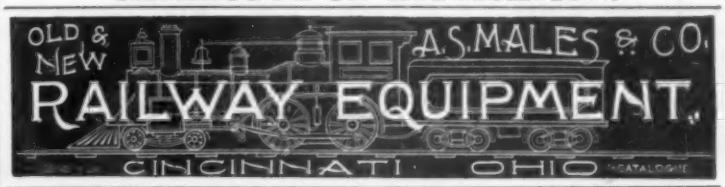


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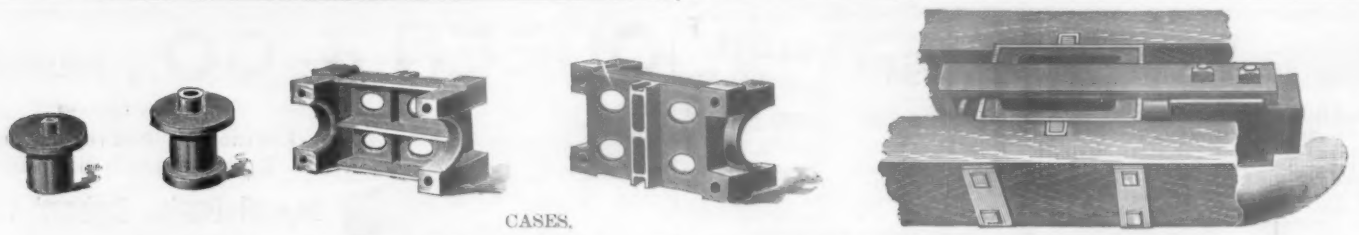

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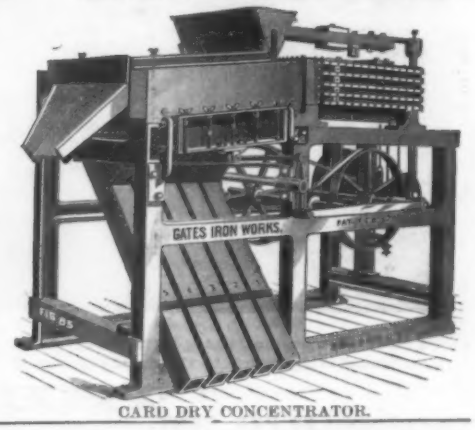


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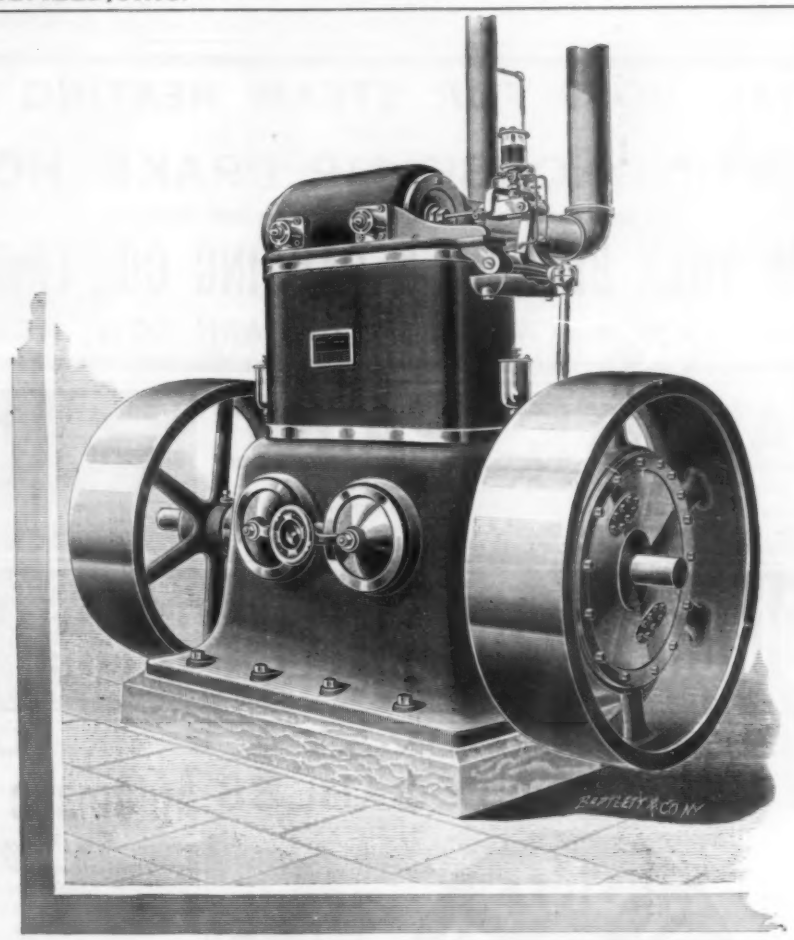

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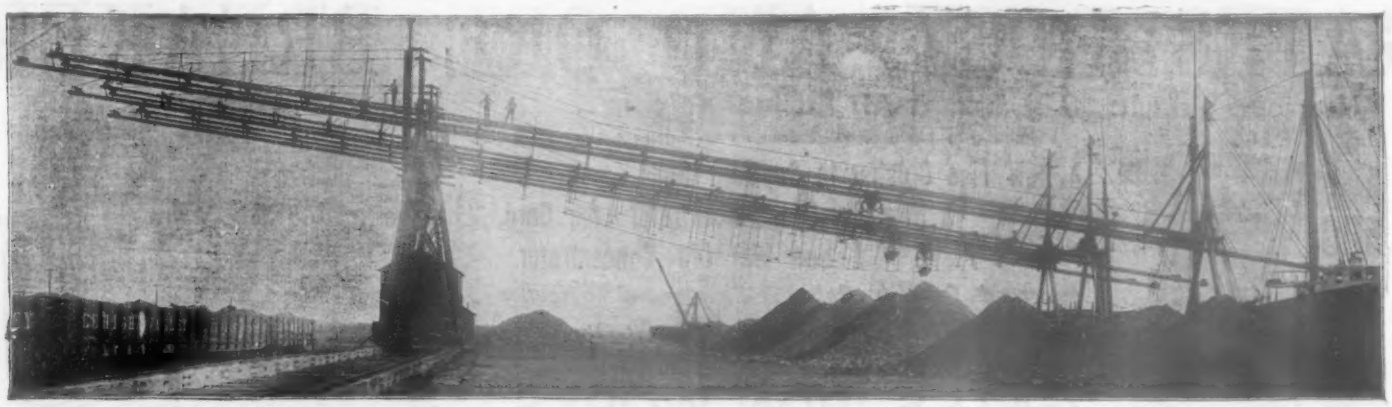

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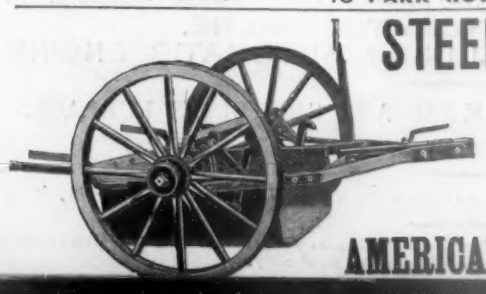

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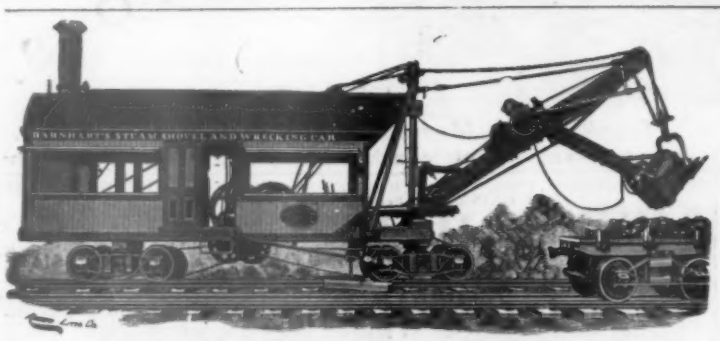


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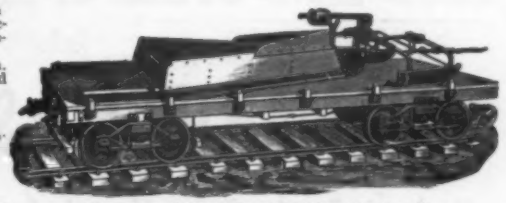

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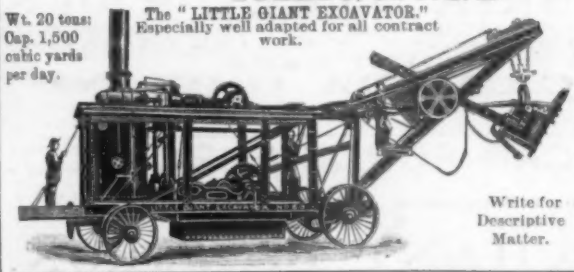

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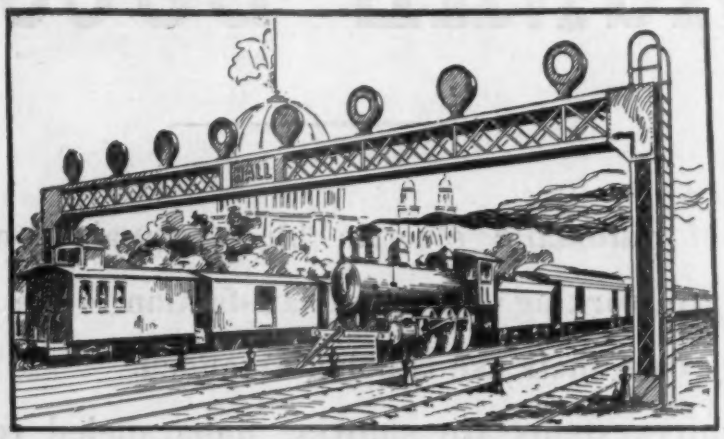

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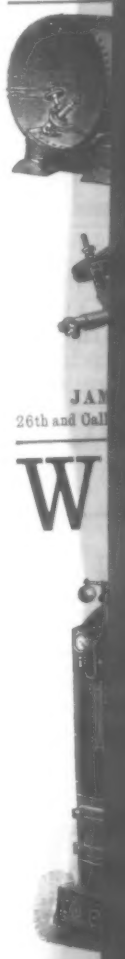

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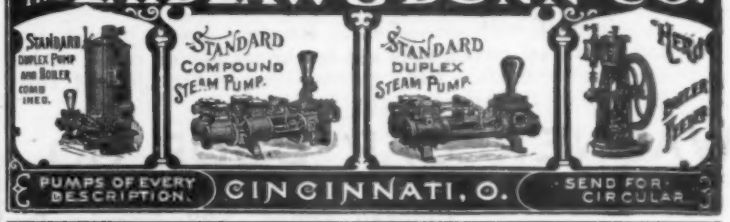


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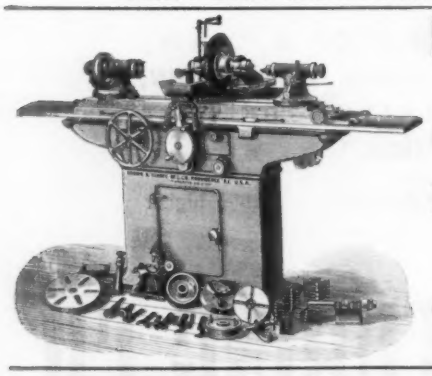

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FRIDAY, JULY 8.

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## Contributions.

### Iron Consumed in Railroad Building.

*The Iron Age.*
NEW YORK, July 5, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of July 1, in the editorial on "Railroad Building in 1892," you say that the building of 10,000 miles of railroad would make a difference of say 1,500,000 tons of iron for joints, bolts and spikes. It strikes us that this must be an error, and that what you mean is 150,000 tons.

C. KIRCHHOFF, *Editor The Iron Age.*

[We intended to say 150,000 tons, but we shall not reproach the proofreader. We estimated the amount for 10,000 miles of single track, and added 20 per cent, for sidings, yards and double track. This gives about 150,000 tons, but even that is perhaps rather too much. EDITOR RAILROAD GAZETTE.]

### Electric Motors as Substitutes for Steam Locomotives.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to your editorial comment upon a recent article of mine on "Electric Motors as Substitutes for Steam Locomotives," I think my second conclusion must need further explanation, as it seems that the full force of it was not evident to you. The conclusion is: "There is a possibility of electricity becoming an economical substitute for steam locomotives for high speed service wherever the traffic is sufficiently heavy and constant to warrant the construction of lines of track independent of those used for moderate speeds."

This is, I think, sound, because the commercial advantage of electricity becomes more apparent as the speed of trains and the volume of traffic increases, and as the latter becomes more uniform, enabling the power stations to be more economically operated.

The efficiency of the electrical transmission of power is not affected by the speed of train, whereas the efficiency of the steam locomotive, especially of the boiler, decreases as the speed, and the consequent rate of combustion, increase. For this and other minor reasons the statement quoted from Messrs. Crosby and Bell that electricity (with 60 per cent. efficiency) becomes more economical than steam *only* at about 140 miles an hour is correct in principle.

In general, then, we must have frequent high speed trains to make electricity pay; slow speed freight trains can be more economically operated by steam locomotives; and I submit that it is not practicable to run the two classes of trains upon the same tracks with any system of signals as now used. When the block system as in use on one of the most progressive railroads in the country fails to prevent tail end collisions at comparatively slow speeds, and when many roads prefer to trust to Providence and the rear brakeman, it is not likely that there is any prospect of an electric train system which would involve two sets of signals becoming commercially practicable.

ARTHUR T. WOODS.

### Fall of a Tunnel Roof.

The following account of the fall of a small portion of the roof of Tunnel No. 6, Pittsburgh, Cincinnati, Chicago & St. Louis, Pittsburgh Division has been furnished to us with the sketches, by Mr. F. T. Hatch, Engineer of Maintenance of Way. The accident took place the night of May 30.

"I would say to start with that the fall was not in any way a serious one. It took us some little time to clean it out, because we had but a narrow place for the shovelers to work in, and could only get six men at the pile at a time. At the east end of the Tunnel there was

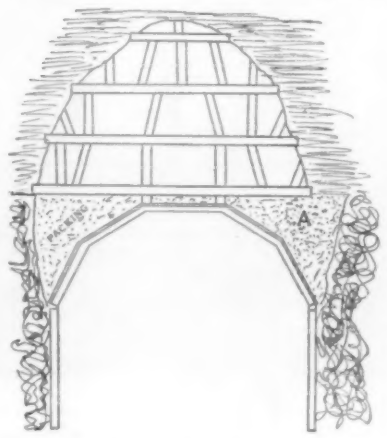



Fig. 2—Timbering Used After the Fall.

a break, some 30 ft. high, over the old arch, caused by a fall a great many years ago. The old arch was loaded with about eight feet of material to hold it down, and no preparations had been made, except that to maintain the arch.

"When we came to take the old arch out we proposed to timber it, as shown in the sketch, fig. 2, but before this timber was placed in position the fire clay over the quarter of the arch, at the point marked *A* in the sketch, gave way and pressed on the timbering with

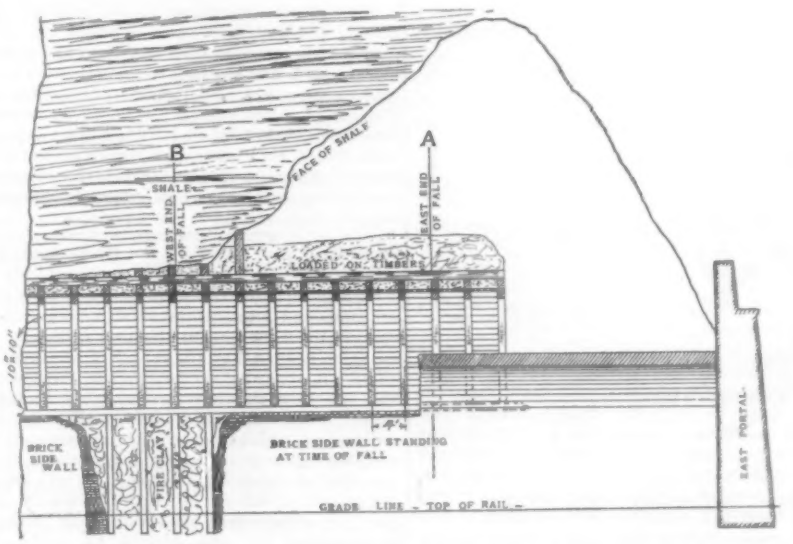



Fig. 1—Longitudinal Section of East End at Time of Fall, Looking North.

FALL OF A TUNNEL ROOF.

sufficient power to squeeze the arch in, thus raising the top segment up and letting it drop out. This caused a fall of from 300 to 400 yds. of material, a great part of which was composed of the eight feet of loose material which had been placed on the old arch to weight it down.

"We had no trouble whatever with the tunnel except the slow process of digging out this material and replacing our timbers. As we replaced them we carried the timber up in the hole as shown in the section. Since that time we have had no trouble, nor do I think there can be any further trouble with the timbers giving way. The tunnel is timbered for its entire length with segmental timber, composed of five segments with plumb posts down to the bottom of foundation, and this whole thing is lagged solid from one end to the other. The material all through is fire clay with shale on top of it, and is of a very treacherous nature. The tunnel is 457 ft. long.

"We commenced the mining about May 1, and expect to finish it by the night of July 3, making about two months to do the mining for 457 ft. of tunnel. The old section of the tunnel was very narrow, and the original mining was very close, making the benches and heading of the new section extremely heavy.

"We have not put any masonry in the tunnel as yet, it being my intention to timber it solid all the way through, as shown in the sketch, fig. 3, and as soon as the miners are out the stone masons will go in, in order to put in the side walls. I expect to finish the side walls in about three weeks, and then by working four sets of centres I hope to close the brick arch in 30 days more."

### Handling Freight Cars in England.

The Bulletin of the International Railroad Congress, No. 1, Vol. 6, contains a long article by Mr. Henry Lambert, General Manager of the Great Western of England on the regulations for distributing empty cars on the principal railroads in England. This was one of the regular questions before the Congress, to be discussed by men acquainted with the subject in different countries, but Mr. Lambert's paper seems to be the only one printed. He confines himself to his own country and chiefly to his own road, for the reason, as he well states, that without a thorough knowledge of the interior organization of each line and the conditions of traffic, a satisfactory treatment of the subject cannot be given.

There is little in Mr. Lambert's article which will prove instructive to American readers, as the practice in England seems to be in no respect better than ours, but we summarize his principal facts. Some of them have a historical interest. The original notion, incorporated in the charters of the earliest English railroads, that individuals should have the privilege of carrying freight in their own cars, still has the force of law there, and technically any shipper may run his own train, provided he will submit to the reasonable regulations of the railroad companies. But, though trains are never furnished or run by outsiders, the practice of furnishing their own cars not only grew up among coal miners, etc., in England, but has become universal, with one or two exceptions presently to be noted. Aside from these mineral wagons, there are practically no private cars in England, excepting Pullman passenger cars on the Midland, and on the London, Brighton & South Coast, and a few covered trucks owned by carriage builders (not railroad car builders).

The total number of vehicles belonging to the roads of the United Kingdom on Dec. 31, 1889, was

| | |
|---|---|
| Passenger cars | 33,137 |
| Other passenger train cars | 13,501 |
| Freight cars | 503,260 |
| All others | 14,335 |
| Total | 567,233 |

No precise information exists as to the number of freight cars belonging to private owners, but the Great Western Line uses from 40,000 to 50,000 of these, from which it is estimated that there are several hundred thousand in the kingdom. A large proportion of these belong to car building companies who let them to traders. Mr. Lambert describes in detail the regulations under which the railroad companies accept and use private owners' cars, the aim being to make sure that

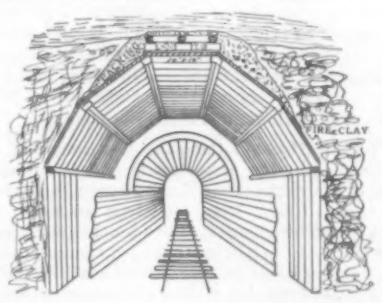


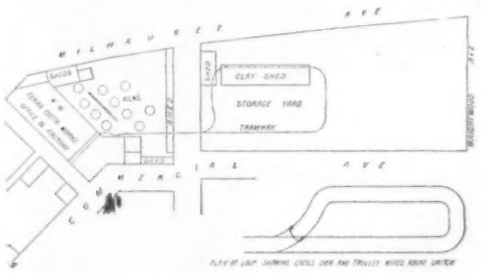

Fig. 3—Cross-Section Showing Timbering at Breast Just West of Fall—May 30, 1892.

they are properly designed and made, and of good material.

During 19 years ending with 1891 the Great Western had inspected and accepted 32,479 private cars. Up to 1888 there was a considerable percentage of 8-ton cars, but practically nothing smaller than a 10-ton car is now

built. A few 30-ton cars are running experimentally. The Midland has bought a large proportion of the cars formerly belonging to private owners on its lines, and now owns 66½ freight cars per mile, while the Great Western owns only 16¼ freight cars per mile. The Northwestern, which has furnished mineral cars longer than the Midland, owns 52 freight cars per mile, while on the London & Southwestern, which has no coal mines along its line, the average is only 10¼. The average number of freight cars per mile owned by the roads of the United Kingdom at the close of 1889 was 25¼, Scotland having more than England, and Ireland very much less than either.

As most of our readers know, the record of the interchange of cars is kept by the Clearing House Association, which employs a number taker at every junction of any consequence. The mileage charge is very complicated, as compared with the simplicity of the American plan. The rate for open freight cars, 11½ ft. long inside, may be taken as the standard; this for distances under 50 miles is one halfpenny, or one cent, a mile, but covered cars, double deck cars and cabooses have a different (higher) rate, and ordinary cars shorter than the length named have a lower rate, and each class has 10 other rates for longer distances, the standard being graduated down to .225 pence a mile for distances of 278 miles and upward. There is a separate rate for the sheets or tarpaulins used to cover goods in the open cars. The junior clerks in the offices must be well versed in arithmetic by the time they have served their apprenticeship, for the rates are given in a great variety of odd figures. The mileage limits are also cross-grained, thus: 79 to 91 miles, 92 to 118, 119 to 138, etc. On passenger train cars the rates are the same for short as for long distances. A certain time is allowed for transit of cars on foreign roads, but as competition compels fast time everywhere this limit is of no account. Forty-eight hours is allowed for unloading, after which demurrage is charged, on passenger train cars from $1.50 to $2.50 a day, and on freight cars 75 cents. It appears that demurrage is charged against a road detaining foreign cars, for the benefit of their owners, extra free time being allowed when a car is returned loaded; but Mr. Lambert gives us no definite information as to




Electric Tramway – Northwestern Terra Cotta Company.

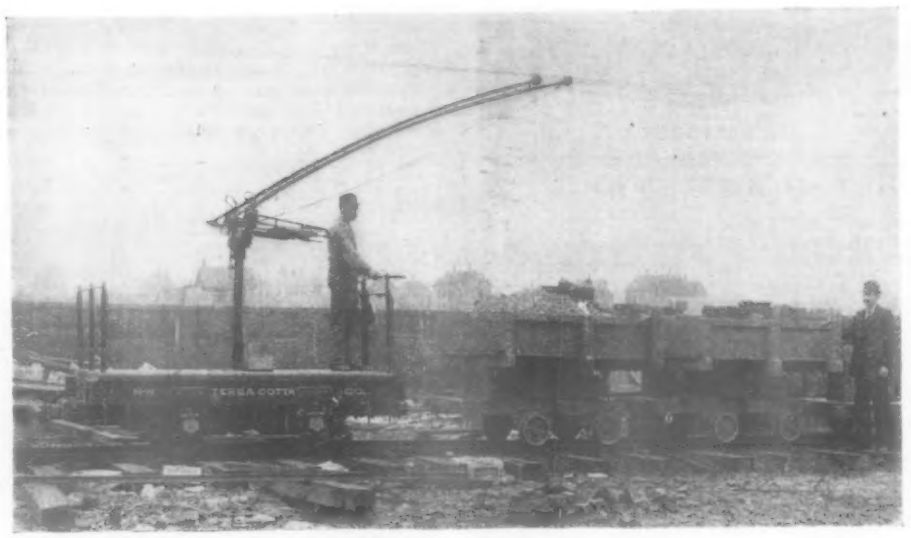
the extent to which this rule is carried out. Under the keen competition which has so long existed in England, "rapid transit has become so much the custom that a failure to deliver goods within the usual and proper time may, in fact does, subject the company so failing to the payment of compensation for delay." This competition leads to a general practice of sending very light loads; freight must be sent by the first train, and "the disproportion between capacity and paying load is everywhere very marked." The Clearing House regulations permit a company to send a car over a foreign line with a load as small as one ton, and even lower limits than this are very common. Here again the writer speaks only in generalities, but what he says is sufficient to show that the field for larger freight cars for merchandise in England must be exceedingly restricted for a long time to come if not always.

The system of reporting loaded and empty cars, cars required for the next day, etc., seems to be substantially the same on the Great Western as on the larger American roads. "Demurrage is as far as possible enforced against the consignees, but it is with difficulty in most cases, and the chief advantage derived is in the reduction of detentions to a minimum." The mileage and demurrage regulations of the Clearing House are embraced in 76 paragraphs, most of them long, filling 23 pages.

## First Electric Mill Tramway in Chicago.

The Thomson-Houston Company has completed and put into operation the first electric mill tramroad in Chicago, at the works of the Northwestern Terra Cotta Co. The line is 1,700 ft. long, including the loop. The overhead conductors consist of two No. 2 B. & S. gauge copper wires. As the power is supplied from an incandescent lighting plant it was deemed advisable not to use one wire, and rail for return current, so a double trolley system was installed. The line has six curves of less than 40 ft. radius.

Considerable difficulty was met in providing a suitable trolley stand for the motor as the wires varied in height from 18 ft. at road crossing to 8 ft. under the sheds. The stand is made of a piece of 3-in. iron tubing placed upright, to the top of which is attached the fixture carrying the trolley bars. This fixture is free to swing entirely around, having a sliding contact, and there is



Motor Car and Trailers.

FIRST ELECTRIC MILL TRAMWAY IN CHICAGO.

also an independent adjustment for each trolley bar. Where the loop returns upon the main line the wires of like polarity are connected by a loop.

It will be seen that in going in either direction from the main line over the switch where the loop branches off, or *vice versa*, the currents passing through the trolley bars would be reversed; but it does not reverse the motor, as the current in the armature and field wires is simultaneously reversed, maintaining practically the same relation between the pole pieces of the field and armatures, allowing the motor to run on continuously. The motor is reversed only at the works for the out trip.

The loop was constructed to save switches and spur tracks, and also to prevent handling the trolley. A loaded train can start from the works and unload in the storage yard, and continue to the clay sheds for a return load for the works. The track is 3 ft. gauge, has 30 lb. T-rail on pine ties spaced 2 ft. between centres. The greatest grade is 4 per cent. The motor car is equipped with two 3 H. P. Thomson-Houston railroad motors, hung on the axles. The motor has the standard T.-H. controlling stand and switch. The motor has hauled 10 tons on a level track.

## Valve-Gear for Two-Cylinder Compound Locomotives.

With the cylinder ratios ordinarily used for two-cylinder compound locomotives it is necessary in order to equalize the work done in the two cylinders to adjust the valve gear so that the cut-off in the high-pressure cylinder is somewhat earlier than in the low-pressure. This has been generally accomplished by making the high-pressure link hanger shorter than the low-pressure hanger, which gives satisfactory results in forward gear, but aggravates the fault in backward gear. With the object of obtaining a satisfactory relation between the points of cut-off in both forward and back gear, an arrangement similar to that shown in the accompanying cut was devised for engines for the Hanover Railroad (Germany), built by Henschel & Son in 1889, and has since given very satisfactory results. The illustration shows the method of applying the principle to the Stephenson gear, but it is also applicable to the Gooch, Allen and Walscharet valve gears. The low pressure link is suspended as usual from the tumbling shaft *O*, while the high pressure hanger is suspended, as shown, from an arm carried by an auxiliary shaft *K*, and is raised and lowered by means of the slotted arm *M* carried by the tumbling shaft. The relation between the cut-offs in the two cylinders of a compound locomotive for the Northern Italy Railroad fitted with the Stephenson valve gear with this attachment is as follows:

PERCENTAGE OF ADMISSION.

| Forward. | | Backward: | |
|---|---|---|---|
| H. P. | L. P. | H. P. | L. P. |
| 0 | 0 | 0 | 0 |
| 10 | 12 | 10 | 12 |
| 20 | 24 | 20 | 25 |
| 30 | 39 | 30 | 39 |
| 40 | 48 | 40 | 48 |
| 50 | 58 | 50 | 58 |
| 60 | 66 | 60 | 66 |
| 75 | 75.5 | 75 | 75.5 |

The valve travel is 6¼ in.; outside lap, both valves, 2 in.; inside lap, high pressure, ¼ in. clearance; low pressure, nothing. A detailed description of the method employed in laying out this motion is given in *Glaser's Annalen* for Dec. 1, 1891.

## Shop Notes.

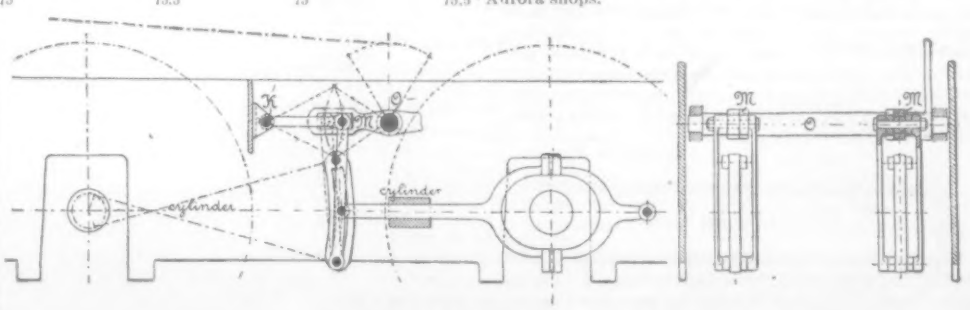
### AURORA PAINT SHOP, CHICAGO, BURLINGTON & QUINCY.

The Chicago, Burlington & Quincy Railroad Co. is building at Aurora a large paint shop to replace the one burned during the engineers' strike in 1889-90. The new shop will be on the site of the old one. It will be of Indiana red brick with stone trimmings, and is to be a one story, flat roof structure with sky lights over each track. The roof will be covered with tar and gravel. The skylights over each track will be carried on four combination trusses running the full width of the building. A series of posts set between the tracks will carry a heavy timber girder running the full length of the shop upon which the ends of the skylight trusses rest. There is a clearance of 19 ft. between the floor and the girders. The lintels over the large swing doors will be of cast iron. Within the shops there are 11 tracks, 20 ft. centres, and each will hold two long passenger cars. The shop has a fire wall, with the usual iron doors, dividing it into two unequal parts, one containing six tracks and the other five.

The east end of this building is carried up two stories, the two floors of which are divided into two parts. On the upper floor will be the varnish room and upholstery department; the lower floor will accommodate the rubbing and washing room and the interior wood finishing department. On the ground floor will be suitable sanitary closets for the use of the workmen. One track only enters this part of the building connecting with the transfer table. A large skylight in the roof lights the interior. In order that the ground floor may be benefited by the skylight, a covered light well and some heavy glass floor lights are placed beneath it on the second floor. The use of the glass floor lights saves much valuable space on this floor.

The floors of the paint shop and the lower floor of the two story building will be of concrete or brick. They will have the proper pitch to carry off the water used for washing and scrubbing. The second story floor will be of hard wood.

This shop is similar in construction to the Pennsylvania Railroad Juniata shops at Altoona, Pa. The large windows and glazed doors, together with the arrangement of the large skylights above the cars, will insure a well lighted shop admirably suited to the use for which it is built. The paint store and mixing room is in a fireproof building opposite the two story annex. The shop which this new one replaces accommodated but 14 cars, and the new one, having room for 22 cars, will greatly relieve the cramped conditions now existing at the Aurora shops.




Valve Gear for Compound Locomotives.

FRASER & CHALMERS—CHICAGO.

There has been such a tremendous advance in the mining interests throughout the world in the last few years and the improvements in the appliances fitted for the vaaious classes of work have been so great that the manufacture of mining machinery has not only become a science in itself, but is now carried forward on a great scale. In this respect this country is successfully competing with some of the old established concerns on the other side and is making shipments to Scuth America and South African ports, as well as to New Zealand, in all of which places our corporations come in direct competition with foreign designs and workmanship.

The firm of Fraser & Chalmers in Chicago has been increasing its capacity from time to time until it was finally decided to abandon its old plant and build on a scale and at a point that will not only supply present demands, but allow for suitable additions in the future. The new plan involves the expenditure of about $800,000 in buildings and from $300,000 to $400,000 in machinery. The site selected for the new plant is just west of the Pittsburgh, Cincinnati, Chicago & St. Louis tracks, on the north side of Twelfth street. The Northwestern freight tracks are along the east line of the property, while the Northern Pacific main line passes along the north side. The transportation accommodations are very good, and with switch tracks running into the buildings and yards will enable the company to handle its business economically. The two principal buildings are the foundry and the erecting and machine shop, which are proportionately large, the latter having a balcony for light tools and small work extending all around the sides, as shown by the dotted lines, which gives alone nearly one acre of floor space. Each of these shops is supplied with overhead traveling cranes.

MICHIGAN CAR COMPANY.

The Michigan Car Co.'s plant at Detroit, employing some 2,500 men, has a capacity of 40 cars a day. They are doing considerable work in the line of refrigerator and patent stock cars, and the amount and quality of the work are the result of close attention to systematic methods followed in construction. Special tools of the later types are used here for gaining, mortising and gang drilling, as well as a large, square-hole drill tool. The advantages of this square-hole machine are now pretty well known. There is no jar or pounding, and the hole is left clean and sharp with but one motion on the part of the operator.

In the erecting shop the work is done on five tracks. The trucks are put together at one end of each track and the underframing or sills are erected on the trucks at this place. The car is then pushed 40 ft. ahead and the floor gang put on the floor. The car is again moved forward 40 ft., and the frame gang raise the posts and struts and bolt them together and then pass the car along 40 ft. to the sheathers, who nail on the sides and roof. The air brake or other fittings are put on at the same time and the whole car is then painted and shoved out. Each car is stenciled underneath with the number of the track on which it was built. As a thorough inspection is given to it just before leaving the yard, any defect is directly traceable to the particular man at fault. Each man of the several gangs, on each of the five tracks, works on his own particular corner of a car, the labor being so divided that moving around is reduced to a minimum. Each man knows exactly how much and what he is expected to do, so that the rapidity with which the cars are finished is greatly increased over that obtainable in smaller shops working without a complete system such as is used here.

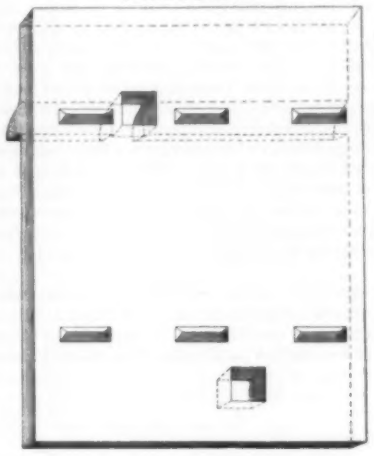
## A New Tie Plate and Spike.

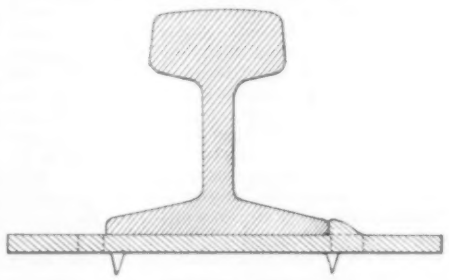
The progress of education in the use of tie plates is well illustrated by the great variety of designs which have been brought forward within the last two or three years. The fact that inventors have been so active and prolific in this field is a fine tribute to the energy with which the cause of the tie plate has been pushed by the people who control the only one that has been yet largely introduced. The case illustrates the fact that we like occasionally to mention that railroad men owe a good deal in the way of education to the supply men; although they do not often like to admit it.

The tie plate illustrated was designed and is patented by Mr. James Churchward, and is sold by the Central Oil & Supply Co., Whitehall street, New York. It is a rolled steel plate about ¼ in. thick and 8 in. × 6 in. or 9 in. × 6 in. area. It has a shoulder about ¼ in. high and six lugs on the bottom, each one of which is about 1 in. long at the base, ¾ in. long at the edge and ½ in. deep. Special rolls have been designed to manufacture this plate, for, as will be imagined, rolling up the lugs is rather a nice process. They are formed first as ribs in grooves on the rolls, until the finishing pass, when the rolls are provided with chambers instead of grooves.

The advantages of a shoulder are sufficiently obvious. On a plate with a plain upper surface the shearing strain brought on the outside spikes, particularly on curves, is very great, and we have been informed of cases in which many consecutive spikes had been sheared off. The lugs on the bottom of the plate are designed to hold the plate from shifting, and, in fact, would add greatly to the hold of the spikes. The claims made are naturally that the plate prevents the tie being cut, preserves the gauge and prevents the shearing of the spike. The lugs are carefully proportioned to completely fill the indentation that they make in the tie, so as to prevent water collecting there and forming a starting point for decay. We do not propose to enter again into any general discussion

*Inverted Plan.*





A New Tie Plate.



of the subject of tie plates, but present this new device with considerable pleasure, for it seems to have excellent features.

The spike which is shown is also controlled by the Central Oil & Supply Co., and was designed by Mr. Churchward from suggestions to him by Mr. J. M. Toucey, General Manager New York Central & Hudson River Railroad. The form of point is the result of considerable experiment. The aim was to get something that would cause the fibres of the wood to be reversed in pulling the spike, and from experiments that have been made with this spike this appears to have been accomplished. The plates are made for the company by the Tidewater Steel Co., of Chester, Pa., and the spikes by Messrs. Ames & Co., Jersey City Spike Works, Jersey City, N. J.

## The Reagan Sand Distributing Bell.

The engravings show a distributing nozzle for locomotive sand pipes which is patented and manufactured by Messrs. James Reagan & Co., of Philadelphia, Pa. They claim for this nozzle that it insures a uniform and gradual distribution of sand from both pipes; that it prevents the end of the sand pipe clogging from the collection of snow or moisture in it, and that it prevents sand being thrown to one side of the rail on curves. Obviously, all of these matters are important, and a cheap

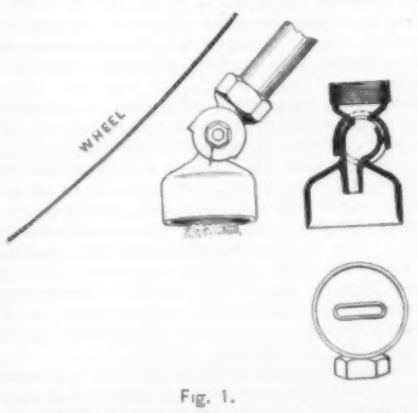



Fig. 1.

and workable device that will insure such results is desirable. We all know that sand is very likely to be left in piles on the rail, and that it often happens that more is delivered from one pipe than from another with the result of an unequal hold of the drivers on the two sides of the locomotive.

The Reagan sand bell is more or less used on the Pennsylvania, the Cornwall & Lebanon, the Central New England & Western, and the Philadelphia & Reading, and the makers refer to any of those railroads.

Fig. 1 shows the sand bell as designed by Messrs. Reagan & Co. Fig. 2 shows it as applied on the Pennsylvania Railroad. On the Pennsylvania the flow of the sand is regulated by a plug or diaphragm tapped as shown in

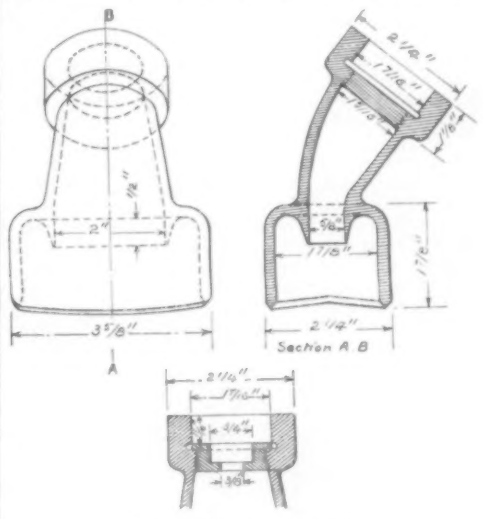



Fig. 2.—Reagan Sand Bell

fig. 2, and screwed into the end of the sand pipe. In the nozzles supplied by Messrs. Reagan & Co., the flow is regulated by revolving the nozzle about the horizontal axis, as shown in fig. 1, or in another form by means of a plug screwed into the side of the bell.

## The Future of Electric Railroads.*

Electric street railroads are no longer experimental nor is their success problematical. Their history for the past five years is that of an almost unequaled development. Almost within a decade has occurred the first working of a practical electric railroad. In a third of that period there have been put in operation or are under contract more than 450 roads, equipped with nearly 6,000 cars and over 10,000 motors, and with over 3,000 miles of track. There is made a daily mileage of not less than 700,000 miles, and over a billion of passengers are carried annually. At least $75,000,000 have been invested in this industry alone.

We no longer hear seriously of the dangers of the trolley wire, the failure of service. Electric street railroad construction has become a matter of engineering, not equipment. Not only have the smaller towns adopted what is the only available means of current supply, but the larger cities are following their example. St. Louis and Baltimore, Minneapolis and St. Paul, Buffalo and Rochester, Boston and Brooklyn have fallen into line, and latterly even Philadelphia seeks an improved street service, and in New York public interest is being aroused.

In these larger cities, however, one condition should be insisted upon, and if this condition is met in the proper spirit, much of the objection which has been raised against an overhead system must necessarily disappear. The construction must be of the very best. The only overhead line allowed should be a contact wire with sufficient strength, while the main conductors and the feeders should be put underground in proper conduits. There would then be overhead only a wire necessary for the smallest duty and of the requisite strength. In many streets, of course, the cable will hold its own until an electric conduit or surface contact system shall be proved satisfactory.

Impressed by the great development of this industry and brought face to face with the changes it has wrought the query is continually made: Will the electric motor replace the steam locomotive? It is similar to the older questions, will the telephone replace the telegraph? Will the electric light annihilate the gas system? And in all soberness a like answer can be made. It will not, but it will, as the electric light and as the telephone have done, create a field of its own, and will replace a portion of the service now done by them.

It seems to me that the growth of electric railroads will proceed something in this order: first, the street systems in the various towns, then connecting lines between adjacent towns following the lines of highway, then longer connecting lines, either on the tracks of existing steam lines, or, growing bolder, on exclusive rights of way on the same order. Then will come suburban traffic on a larger scale, and freight transfer systems, and finally the more ambitious projects of trunk line service under limiting conditions, such as I will specify. It has been very properly said that a man will make the first long rides on electric railroads by transferring from one town system to another through connecting links, rather than on individual roads. This is precisely the process by which great steam systems have been built up, although of course starting on a larger scale, and it is but natural that this shall be one step in the development of electric railroads.

But evidently this natural process of evolution does not offer scope enough for the more enthusiastic, and

*Abstract of an address by President F. J. Sprague before the American Institute of Electrical Engineers.

we are now and again treated to an ideal electric road to be built on plans boldly defying both geography and the abodes of civilization. An air line route according to rules of surveying allowed only in Russia and on the Desert of Sahara, abolition of grade and street crossings, rigid and continuous rails, loaded cars of light weight, each operated by its own motor and making few or no stops; unlimited potentials and undiscovered resistance to insulation; new physiological and engineering laws; indestructible machinery; unheard of powers of braking and new methods of train operation and signaling; around all a clear atmosphere, above all a perpetually smiling heaven, and behind all an unlimited bank account and the unlimited confidence of the investor. Such are some of the characteristics of such a road, but perhaps it is but fair to ask, given some of these conditions, what would be the capacity of steam traction?

No one will question the capacity of a motor to do the necessary work required, or to make a speed superior to that of the steam locomotive, provided sufficient energy be delivered to its terminals; but we must deal with existing or probable methods of supply. It is true that the speed at which a train is propelled by steam has only increased about 50 per cent. in 60 years, for in 1832 the "Matthew Baldwin" often made a speed of a mile in a minute; but we must not confound speed with power, for while the maximum speed has not been so materially increased, the endurance, the perfection of the mechanism and the economy of performance have made great strides, and the increased speed, which is by no means the maximum possible of a locomotive *per se*, has been attained at much higher powers, and the schedule time has been shortened principally by cutting down grades, shortening curves, filling up ravines, abolishing trestle works, replacing wooden bridges by permanent ones of iron or stone; by the use of heavier and stiffer rails, better switches, improved methods of automatic signalling, the interlocking switch and signal system and the abolition of grade crossings; in short, by improvements in details and management which permit of higher speeds on more extended sections of road because of greater safety, lower traction coefficients and a greater degree of confidence possessed by the engineer.

All these things are necessary for high-speed electric railroads, and any general improvements that will be of benefit to the latter must necessarily be of service to the former.

[Mr. Sprague then reviews the recent high-speed runs made by steam locomotives.]

Experimental runs have been made with an electric locomotive at the rate of a mile in 30 seconds; that is, 120 miles an hour, and I confidently expect some day to go at that rate. But it will be under special conditions, and not on the regular trunk lines of this country, and it is the height of folly to suggest that these steam trunk lines are to be abolished.

In discussing the electric system there is often a confusion of statements with reference to economy. Despite the undoubted fact that the electric motor can probably be run at variable high speeds with less variation of economy than can the steam locomotive, we must not forget that in the latter we are considering the economy of the unit as a whole, not merely of the steam cylinders, but also of the boiler and the furnace.

In electric propulsion a similar comparison of economies must take into account the variable duty of the central station and the losses on the line as well as those in the motor, and where single units are used the variation in economy of the whole system would be much greater than in the steam locomotive. There will be a reasonable fixed efficiency of the central station and the line only when the number of units is large to make the load on the central stations nearly constant.

In regard to elevated railroad service an analysis of the coal expenditures on the elevated roads in New York showed that with an efficiency of 60 per cent. and without any of the energy of the train being returned to the line, the relative coal expenditures between steam and electricity would be about in a ratio of 2 to 1, but if the energy of the train was returned to the line to the extent which I believe it is possible, then the relative expenditures of fuel would be in the proportion of 7 to 2. Since the coal charge on the four divisions was at that time about $550,000, it can easily be seen that independent of any question of saving in the case of the structure and any reduction of depreciation of the motor equipment, the fuel saving would be sufficient to pay a good interest on the cost of an electric equipment; and a large interest on the cost of electric equipment minus the value of the present engines.

Turning now to the greater powers, we must not confuse the terms "Large powered," and "Trunk line" work. There are two statements which I think will need no corroboration. If we had a continuous train movement completely occupying a track system, there can be no question but that its operation from a central source by electricity would be more economical than if operated by steam locomotives. So, too, if a large number of units in reasonable proximity are moved, and the stopping and starting is so regulated that the total demand upon the central stations is fairly continuous and equal, then there is no question as to the economy of electric propulsion as compared with steam. On the other hand, the operation of a single or very few units over a long distance would be so uneconomical, and afford so small a return on the investment required, as to make it prohibitory. Between these two lies the condition of operation where steam and electricity meet on planes of equality. As the number of trains decreases steam operation is the more economical; as the number increases electricity must be preferred.

In discussing the use of electricity instead of steam a well known steam engineer recently stated that in his judgment it must be conceded that electromotive force for the propulsion of cars will not be economical except for suburban traffic and upon certain sections of important trunk lines like the New York Central between New York and Albany, the Pennsylvania system between New York and Philadelphia, and other lines of like character where it is necessary to dispatch a large number of comparatively light trains every day and at short intervals. The principal field for a power of this kind would be in suburban service long enough to make the ordinary street electric cars unpopular, because of the time required, also for moving freight trains in cities; that is, for the performance of transfer service.

This is precisely in line with the arguments which I have advanced from time to time, and which I illustrated in a paper before the National Electric Light Association at its convention in Kansas City, where I outlined the possible service between New York and Philadelphia, which I believed to be practicable, and to which I will again refer.

I must repeat that it narrows itself down to the one question as to the number of trains operated between two terminal points. Make that number of trains sufficiently large, and the electric motor is the best means of propulsion, whether for high or low speed, whether for large or for small cars. Decrease this number and we must rely on steam propulsion, or, to put it in another way, the answer to the query, Will electricity take the place of steam for railroad purposes? is: Only in part, and then only when the number of units operated between the terminal points is so large that the fuel economy would pay reasonable interest and depreciation on the necessary cost of the central stations and the system of conductors.

Of course, I do not in this general reply consider those special cases where advantages are to be gained for which there is a return for capital in another direction. Such a case is that of the Baltimore tunnel, where the investment and cost of operation will be greater than that for steam propulsion; in fact, there will practicably be no economy in power, because the steam locomotives are not done away with but simply unused for a distance of a little over a mile. There is in this specific case, however, the incidental advantage of doing away with the necessity of a ventilating plant and yet getting rid of the annoyances incidental to tunnel service.

Every system has its limitations. The electric system is not exempt from this law, and hence I will set forth what are well known limiting laws concerning the transmission of energy. They have been stated time and again, but somehow or another people often lose sight of them in discussing the question of investments in large electric railroads, so that I think it would be well, perhaps, to re-state and to emphasize them.

The weight of copper necessary to transmit a given amount of power with a fixed loss will vary inversely as the square of the electromotive force used.

The distance to which it can be transmitted with a given weight of conductor will vary directly as the pressure.

The distance to which it can be transmitted over a conductor with a given cross section will vary directly as the pressure.

The weight of copper necessary where the supply station is in the centre of a system is only one-quarter that required if the station is at one end.

The weight of copper will vary inversely as the square of the number of supplying stations properly placed.

The electromotive force required will vary inversely as the number of stations.

Lack of knowledge of these simple and unalterable laws has led to much misconception of electrical possibilities, and these have not been confined to electrical engineers.

In many of the suggestions which have been made even by practical steam engineers, there has been an unnecessary confusion of impracticable and practicable, and the specific object which should have been borne in mind has been lost sight of. Committees have drawn impossible specifications for trunk line service, and demanded of electric motors a capacity and performance superior to that of the best compound steam locomotives. I unhesitatingly pronounce any attempt to build such machines, for the present, certainly unnecessary and impracticable. The service thus suggested, if at all needed, will for many years be better performed by the steam locomotive than by the electric.

Leaving out of present consideration trunk line work, there are three problems requiring solution in the application of electricity to propulsion on a large scale under conditions existing, for example, in Chicago or in any other place where there is a movement of a large number of trains on more or less complicated tracks, as will be found at almost all terminal railroad stations. They are:

*First:* The development of an electric locomotive of ample power which shall be as readily controlled as the steam locomotive, shall be reliable in operation, and shall show a high economy. Of course, such a machine must have all the adjuncts which are necessary for train movement.

*Second:* A system of conductors and methods of supporting the same which can be relied upon for ample supply of current and absolute certainty of continuous contact at all speeds, on curves, switches, crossovers and the multitudinous combinations which exist on yard tracks.

*Third:* A system of automatic block signaling, which, while effective for steam traffic, will not be thrown out of operation by the use of tracks as conductors of electricity for a general supply. This is a more serious question than it is at first considered, for this use will materially interefere with, if not absolutely destroy, the utility of what is known as the rail circuit system. This third problem is one which must necessarily follow the development of the other two, as the automatic signaling systems now existing have followed the development of the steam practice.

While I am not by any means thoroughly familiar with the various methods of automatic signaling, I believe I am justified in saying that there is none at present existing which will meet all the requirements of railroad practice, and which can be operated on tracks used by both steam and electric locomotives, where the rail is used as a part of the supply circuit. Some of the best known systems of signaling would be rendered entirely inoperative.

From the most careful consideration which I have been able to give to the subject, I believe there is one way, and only one way, in which the current can properly be supplied in any complicated system, and that is from the overhead conductor, practically rigid in character, following very nearly the centre line of all tracks and switches, with no movable overhead parts, and with return through the rail. The locomotive would then practically be moving between two electric planes, the lower being the guiding one.

Intimately connected with the question of conductors, and one of the most serious ones which has to be met by the electrician, is that of potential. The personal danger limit of continuous or ordinary period alternate currents, is pretty well determined, and it seems generally admitted by constructors that the danger limit for the continuous current machine with its commutator is about the same as the personal danger limit. Hence we meet with two dilemmas. If using continuous current motors, we are limited to a difference of potential per machine of 1,000 to 1,200 volts, and we can, so far as safety of the machine is concerned, only probably go above this limit by putting the motors in series, precisely as has been proposed for long distance stationary transmissions. If this is not done then we have the introduction between the transmitting dynamo and the receiving motor of a motor generator system, another pet theory which is often suggested but which I unhesitatingly pronounce to be so uneconomical as to be impracticable. If using an alternate current system, then converters must be used, either distributed along the line and supplying the working circuit or placed upon the locomotive to safeguard the motors. While the use of a converter under these conditions is not as objectionable as the use of a motor generator, it cannot commend itself as a very practicable scheme, and certainly in view of the fact that no single phase alternate motor promises, up to the present, serious success.

For the present, and I think for a long time to come, we must confine ourselves to the consideration of railroad problems where continuous currents are used, and where the traffic between two points is sufficiently large to justify the investment in central stations and conductors which would be required for the operation of such a system.

There are two methods of propelling trains electrically, one by following steam practice, that is, by building a large motor and hooking it to the head of a train, the weight of the motor being such as is required for the necessary power and traction when grades or slippery tracks are encountered. From all that has been developed up to the present, to get the control that is necessary and to build the machines safely, the electric locomotive will weigh nearly as much per horse power as the steam locomotive. This weight can be better distributed, but I do not think, if steam practice is followed on trunk line service, that there could be any very material reduction of weight of train.

The other plan is to have each car propelled by one or more motors. This would be the ideal system, so far as propulsion goes, provided the electric motor was unlike all other mechanical apparatus, and that it never failed, and if a number of machines could be as well taken care of, cost no more and show as little depreciation as fewer machines of larger capacity operated as a unit. Should we ever arrive, as we all hope, at the possession of a single circuit alternate current motor, then, in view of the simplicity of its control, we may fairly hope for the distributed motor system.

Among the roads which are ripe for the electrical engineer, and on which in the near future I hope he will demonstrate that he has a most legitimate claim, are the New York Elevated and Chicago Elevated, the handling of the trains on the New York Central and Harlem roads below the Harlem River, the long-talked of rapid transit road of New York, the Metropolitan underground road of London, the proposed tunnel roads in London, Paris and Berlin, and coming more immediately home, suburban service, such as that of the Illinois Central Railroad, a most ideal track for the electrical engineer, and last, and as it will prove, one of the most important, the operation of terminal and warehouse systems for the interchange of freight on the lines entering a city situated as is Chicago.

All this is said in no spirit of discouragement, for I

yield to no man in my confidence in the future of electric traction. No new field is so rich, none more pregnant with great possibilities, but the growth of the work will be more expeditious and healthy if we separate the visionary from the real, the impracticable from the practicable.

### The Worsdell Intercepting Valve.

We illustrate a design of intercepting valve for compound locomotives that has been used very successfully on engines of the Worsdell, von Borries & Lapage system. It is entirely automatic in its action, that is to say, it allows live steam to be admitted to the low pressure cylinder at starting and automatically cuts off this supply, thus converting the engine into a compound when the receiver pressure has been raised to the proper point by the high pressure exhaust.

valve *I* is merely used to plug up the core hole made in casting the valve.

This valve, as well as the Von Borries valve, is being introduced in this country by George L. Fowler, of 53 Broadway, New York.

### Swiss Cable Railroads.

The rapid growth of cable railroad construction for mountain service in Switzerland has led to an interesting review of the subject by Mr. Emil Strub, in a recent issue of the *Schweizerische Bauzeitung*.

Commenting on the variety of design encountered in the roads thus far built Mr. Strub points out that the grades range between 12 and 60 per cent. There are single and double tracks, with and without rack rails, and power is obtained by water ballasting, electrical transmissions, steam and turbine installations.

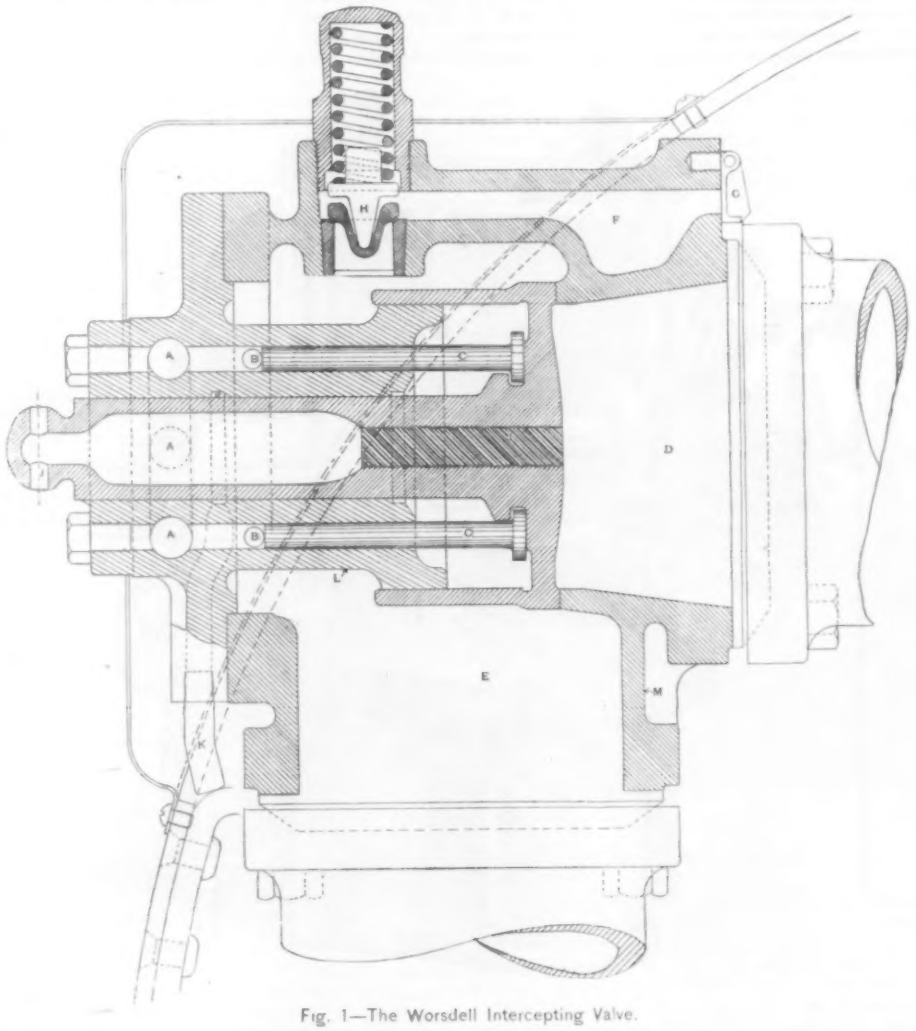



Fig. 1—The Worsdell Intercepting Valve.

When the engine driver opens the throttle valve steam is admitted through the holes *A A* over the stems of the plungers *C C*. These plungers are then forced to the right, pushing the main valve *I* against its seat and opening the port holes *B B* that connect with the chamber *E*, as show in the cross section, fig. 2, which leads directly to the steam chest of the low pressure cylinder. Thus the live steam is also admitted below the relief valve *H*, so that should the pressure in the low pressure steam chest rise above that desired, this valve will open and allow the excess of steam to escape into the smokebox. The small flap valve *G* which closes the passage *F* from the safety valve is used to prevent an accumulation of cinders collecting about the safety valve as a result of long disuse. A drop pipe *K* is also provided to carry off the water condensation and leakage from the annular space *O*.

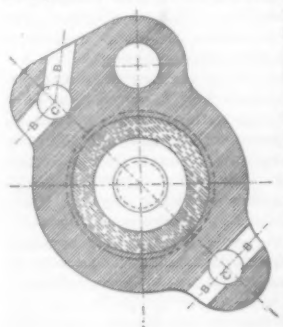


Fig. 2.

After the high pressure cylinder has exhausted into the chamber *D*, the pressure in that chamber rises sufficiently so that the pressure on the under side of the valve *I* overcomes that on the stems *C*, and the valve *I* opens, re-establishing communication between the exhaust *D* of the high-pressure cylinder and the receiver *E* of the low pressure. At the same time the stems *C* close the ports *BB* and the engine proceeds with its work as a compound. The plug shown screwed into the

In the matter of grades the maximum limit appears to have been reached in those roads, ranging up as high as 60 per cent., and a recent design for a road embracing a 74 per cent. grade was reported upon adversely by the Swiss railroad department, since it was concluded that with the common methods of construction such a grade was unsafe. It was thought to involve too much danger of tipping of the cars when applying brakes at the higher speeds, both in rack and cable roads, and in the former, moreover, the position of the tooth flanges became such as to render the racks dangerously inefficient. As offsets to this danger, of course, suitable methods of anchoring the rails to the roadbed and the cars to the rails could be adopted, but still the available anchoring devices for cars and rails could not be satisfactorily applied in all instances.

In one of the Swiss mountain roads now being built and having a maximum grade of 60 per cent., rack rails are to be dispensed with altogether, and safety is to be secured by the use of track brakes. Trials have been made on a short experimental section of road having a 70 per cent, grade to determine the degree of efficiency such of track brakes, and the results are said to have been entirely satisfactory, in fact to have conclusively demonstrated the superiority of the track brake to the rack rail and pinion system.

With two exceptions, those of the Lausanne-Ouchy and of the Marzili roads, a gauge of one meter has been adopted for the tracks, a narrower gauge having been found undesirable, especially for double track roads. In fact, a gauge wider by from 10 to 20 cm. (about 4 to 8 ins.) has been recommended to give more room for the cable drums, levers and other accessories. Official sanction is withheld from projects contemplating a gauge narrower than one meter.

As to the profiles, Mr. Strub points out that the theoretically correct profile curve is parabolic, the closest practical approximations to which are found in the cases of the Salvatore, the Bürgenstock and the Territet-Glion roads, which are already in operation, and the Ragaz-Wartenstein and Stanserhorn roads, which are at present in course of construction.

As to track arrangement, there are two, three and four-rail track plans in use, the choice of any one of which, of course, depends upon special considerations, and for which no hard-and-fast rule can be laid down. For heavy traffic, a comparatively short length of road and slight construction difficulties the adoption of two parallel lines of track is to be recommended. This arrangement gives the best cable service with a comparatively low working cost, and the first cost of construction, moreover, does not come much higher than that of two, or three-rail roads with expensive turn outs. For long lengths of roads and with a heavy grade, necessitating a masonry roadbed, a two-rail, or in other words a single-track road, is thought to be the most desirable. Between these two we have the three-rail line as another alternative.

The principal advantage of the single-track road is, obviously, the comparatively low first cost, an item which grows in importance with the length of the road. Opposed to this we have in the three-rail road the advantage of greater simplicity of turnouts and the fact that the cable need not be kept below the level of the rail heads, since the wheels of the cars need not cross the cable at any point. This latter is a matter of considerable importance, as the track and cable crossings in single-track roads at turnouts are apt to give trouble unless carefully guarded. All the Swiss mountain cable railroads, excepting the Bürgenstock, the Salvatore and the Lausanne-Ouchy roads, use water ballast as motive power. For the shorter roads and where a water supply is obtainable at a moderate cost and where, finally, the quantity of water ballast necessary for each trip is not unduly great, the system is generally the most commendable one. The method of operation is simple, the capital to be invested is comparatively light and the operating expenses are low. For long roads, however, with unfavorable profiles, heavy cars and stiff cables, and where, further, the water must be carried several miles to the working point, some other form of motive is desirable.

In a second article Mr. Strub gives a comprehensive table of the cables used on the several roads in Switzerland. This table enumerates the various roads, the number of cables used, date of opening of the road, lengths, radii of curvature, maximum pull on cables, factors of safety, diameters of cables and pulleys, and other similar data, making altogether a compilation of considerable interest and value.

Mr. Strub states that in the case of cables which have seen several years' service, breaks of strands should be given more attention than in comparatively new cables, since in the older cables there is always more or less corrosion of the inner wires, impairing their resisting power to a greater or less degree. For obvious reasons no hard and fast rule can be given to guide the engineer in exchanging cables.

In the matter of cable structure, Mr. Strub favors cables with interlocking surface strands and without hemp cores. In such cables there is less surface wear owing to the flatness of the strands; there is more uniform tension of the several wires; and there is less tendency to internal corrosion. In cables with hemp cores, the latter will, he states, always retain more or less moisture, which has come from the outside, and will ultimately decay and thus seriously impair the texture of the whole cable, inducing looseness and shifting of the strands and general weakening. Besides, there is the constant tendency to internal corrosion, already mentioned. This is particularly true in the case of cable roads which have only a summer traffic, and in which the cable is thus left exposed on the line throughout the winter, receiving no care whatever.

While formerly the absolute tensile strength of a cable was ascertained, tests of the individual wires are now also made as likely to afford a more reliable measure of the quality of the material employed. The limits of tensile strength are given as 130 and 150 kg. per sq. mm. (about 180,000 and 208,000 lbs. per sq. in.), though where the cable and drum diameters are comparatively small and the curves of short radius a softer material is to be recommended.

The size and number of the cable rollers for a given length of line, as well as the character of the cable lubricant used, have an important bearing on the durability of the cable. The cable supporting rollers in general vary from 16 to 36 cm. (about 6¼ to 14⅛ in.) in diameter; the drums, at the curves, from 12 to 60 cm. (about 5 to 24 in.), and the main drums, at the terminals, from 274 to 600 cm. (about 110 to 240 in.). The large drums are generally lined with some variety of tough wood, while the smaller carrying rollers are lined with cast iron, composition metal, wood or some rubber composition, the object always being to protect the cable from wear at the expense of the drums and pulleys. Automatic lubricating devices for the cable are also recommended.

### Storage Batteries for Street Railroads.

The Second Avenue Street Railroad Company, of New York, has applied to the State Board of Railroad Commissioners for permission to use storage batteries for electric motor power.

### The Fox Emergency Train Stop.

The idea of stopping a train, in spite of the engine driver, in case a signal is against him, or in case of derailment, has been a favorite one with inventors since the air brake was made automatic. It is easy and obvious to rig some contrivance to let air out of the train pipe and to attach it to a signal or switch or drawbridge. It seems easy also to have a depending lever that shall strike the ground when the wheels drop off the rail. One of the earliest inventions of the first class was a glass tube projecting above the cab and in free communication with the train pipe. To the signal post was rigged an arm or rod to be thrown into position to

Fig. 1.

break the tube when the signal was put to danger. A derailment emergency apparatus was devised by Mr. George Westinghouse, Jr., himself. None of these contrivances have ever had any success, for reasons that we have repeatedly stated; but it does not follow that none of them ever will. The latest thing of the sort that we have seen is the one illustrated here. We give the description in the language of the inventor:

*Valve.*—A valve is connected with a branch pipe leading from the brake system of the engine and train (see fig. 1). This valve is applied directly back of the pilot, on either side of the locomotive, in front of the forward wheels, outside of and from 8 to 12 in. above the rail. The valve has attached to it a lever arm, which is a part of it, and which connects with an air port in said valve. The lever arm is in line with the ground device, which is fastened to the ties.

*Ground Device.*—The ground device, fig. 2, is fastened to a tie in position to engage the arm of the air valve. This ground device consists of a plate fastened to the tie; it has a tee-head, two-part upright arm, which revolves on a centre shaft connected with the base. The tee-head or upright is held in position by coiled springs of sufficient stiffness to properly open the valve as the engine is passing, the springs providing sufficient elasticity to obviate or overcome the necessary friction or shock due to the speed of the moving train, or deflect in an encounter with the snow plow. At the end of the shaft or revolving centre upon which the tee-head or upright arm works is attached a wheel from which wires run to the switch or signals.

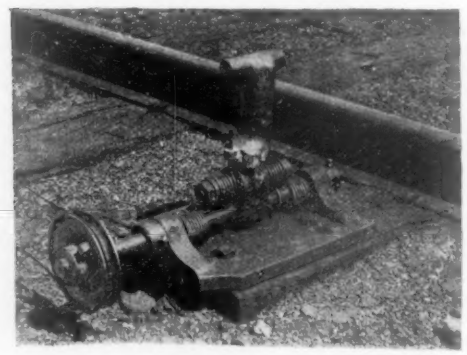


Fig. 2.

*Portable Device.*—There is also provided a portable emergency stop, having the same tee-head above described. The base is a metal frame, made light and so arranged that it has only to be slipped under and against the outer flange of the rail and rested on the ties. This portable emergency stop is intended for use in flagging approaching trains in the event of accident to a preceding train, and will perfect protection in track work.

A public exhibition was held on March 31, 1892, on the New York & Northern Railroad. A train consisting of three empty passenger cars was run at the rate of 20 miles an hour and stopped with the same results as would have been the case had the engineer applied the brakes in case of an emergency. The train was then stopped from 40 or 45 miles an hour with perfect results.

### East River Tunnel.

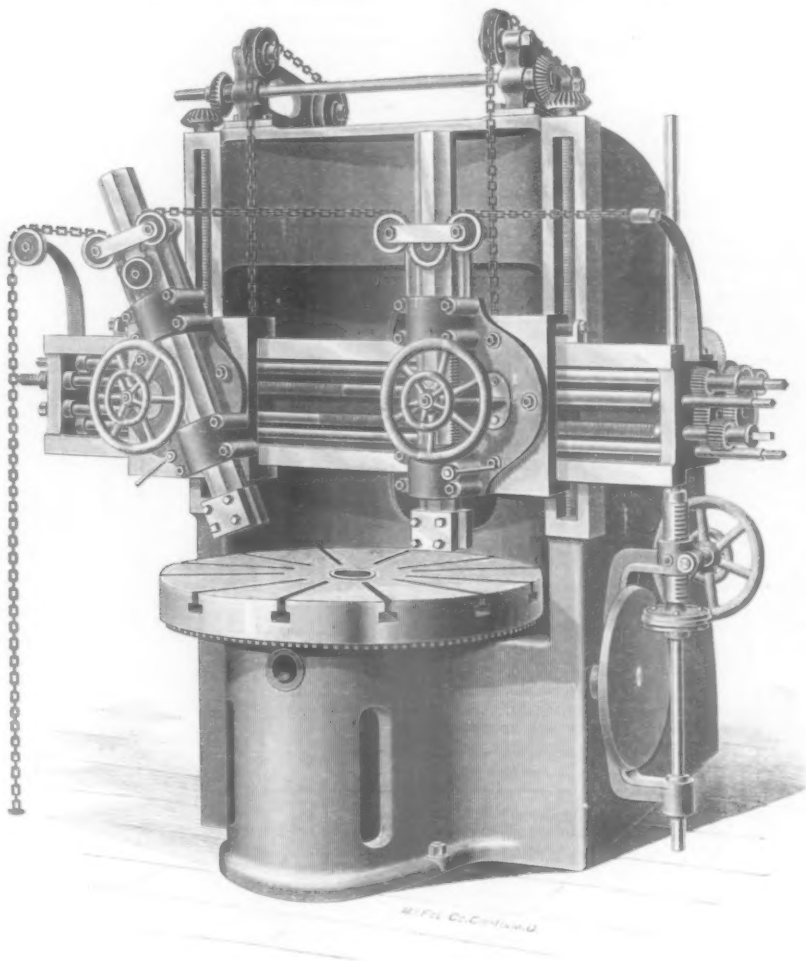
The New York & Queens County Railroad has applied to the Board of Aldermen of New York for permission to construct a tunnel under the East River from Thirty-fourth street. Joseph F. Carey is President of the company.

### 37-Inch and 51-Inch Boring and Turning Mills.

The engraving shows a new type of small boring and turning mill for general work, built in two sizes—to swing 37-in. and 51-in. respectively, by the Niles Tool Works. Although differing somewhat in design from their mills of greater swing, these machines possess the same general characteristics. Advantage has been taken of the comparatively small swing of these mills to employ a strong form of construction. A single casting forms what would otherwise be the bed, housings, and top brace. The column partially surrounds the table, and in its front and rear webs are apertures for the admission of light to the table from the back.

The driving cone is placed at the back, and transmits motion to the table through bevel gearing. It is strongly back-geared, which, in connection with the two speeds available from countershaft, affords a wide range of speeds for the table.

The cross rail is of box girder form, with wide bearings. It is counterbalanced by weights suspended in the column to facilitate adjustment by hand. The saddles are made right and left, allowing the boring bars to work close together. The boring bars are of octagonal section, and they may be set over to operate at any angle. Both are counterbalanced by a single weight, so arranged as to render the weight of the bars absolutely inert, no matter in what position one or both may be placed for angular work.



37-IN. BORING AND TURNING MILL.

*Built by* THE NILES TOOL WORKS, *Hamilton, Ohio.*

The feeds are operated by a friction disc, which permits instant variation of the feed to any degree within its range. The feeds are independent, and the saddles or bars may be fed in the same or opposite directions at the same time. The feed may be instantly reversed without shifting the friction disc.

In place of one of the regular heads this machine is sometimes provided with a special boring head. This consists of a saddle mounted on the rail and carrying a boring handle driven from a separate cone. It operates while the table remains still, and has all the necessary adjustments and changes of feed and speed to make it a complete boring machine. Such a head is capable of boring at any point on a piece of work secured to the table. By its use both holes in engine cranks may be bored at one setting and absolute parallelism insured.

The following are the general dimensions, etc.

*37-Inch.*

| | |
|---|---|
| Swing | 37 in. diam. |
| Greatest height under rail | 30 in. |
| Traverse of boring bars | 18 in. |
| Range of feed | 0 to 5-16 in. |

*51-Inch.*

| | |
|---|---|
| Swing | 51 in. diam. |
| Greatest height under rail | 36 in. |
| Traverse of boring bars | 24 in. |
| Range of feed | 0 to 5/8 in. |

### East River Bridge.

The East River Bridge Co. proposes shortly to begin the construction of two suspension bridges between New York City and Brooklyn. The company is incorporated under an act of March 9, 1892, the incorporators being George Hoadly, Adolph Ladenburg, Abram J. Hardenberg, George W. Wingate and Frederick Uhlmann. The officers are: Frederick Uhlmann, President; Jacob Ruppert, Vice-President; Geo. W. Wingate, Treasurer, and Elisha Dyer, Jr., Secretary. This corporation is closely allied to that which owns the Brooklyn and Union Elevated systems in Brooklyn, and these bridges are intended to make New York connections for these railroads. George B. Cornell is Chief Engineer for the company.

According to a provision of the act, the company will have the power to connect its tracks with some or all of the elevated roads in New York, but this scheme has not been developed as yet.

It is proposed to commence construction of the upper bridge, that to Williamsburgh, at once. It must be begun within a year according to law, and will, it is said, be started in October of this year and completed within eight years after its commencement. The company is not required to begin building the lower bridge until the upper one has been opened a year, but must complete it within six years after commencement.

The law requires that the upper bridge must start between Delancey and Rivington streets on the New York side, and that it must occupy private property between those streets as far as the Bowery, from which point the elevated road may go westward through Spring street. The entrance for pedestrians and wagons will be at Sheriff street between Delancey and Rivington. From Cannon street it is obligatory upon the company to build the approach to the Bowery to accommodate passengers who wish to cross the bridge on trains. There will be no pedestrian and team entrances to this approach, however.

On the Williamsburgh side the act allows considerable liberty to the company in the selection of a site for the pier and bridge approaches, specifying only that the bridges "shall cross the river as directly as possible" from a point "at or near Broadway, Williamsburg, and between the present pier line and Marcy avenue." Marcy avenue is seven blocks from the river. The east tower will stand about midway between South Fifth and South Sixth streets, one block north of Broadway, and the approaches will occupy private property between those streets to Marcy avenue, where the entrance for teams and pedestrians will be located. There will be a station at this point were passengers may take trains. The through tracks, however, will here turn into Broadway and connect with the elevated road.

For the lower bridge the act requires that on the New York side the bridge must start from a point on the river front between Jackson and Scammel streets, and the approaches shall run north between those streets over private property, cross Grand street and go over private property between Sheriff and Ridge streets, and across intervening streets to a point or place on private property between Delancey and Rivington streets in junction with the line or route of the upper bridge approach. It is desired to have the entrance for teams and pedestrians and a large railroad station at the junction of Grand street and East Broadway. The approach, which connects with the approach to the upper bridge, is to carry trains to the Bowery and to the Spring street elevated railroad.

On the Brooklyn side the law admits a large discretion. It specifies that the pier shall stand somewhere between Bridge and Little streets, and that the approach shall commence "at a point between the pier line of the East River and Fulton street." The probable course will be from a point between Gold and Hudson streets, over private property to Myrtle avenue, where the foot and wagon entrances will be located, and where rail connection will be made with the elevated railroad.

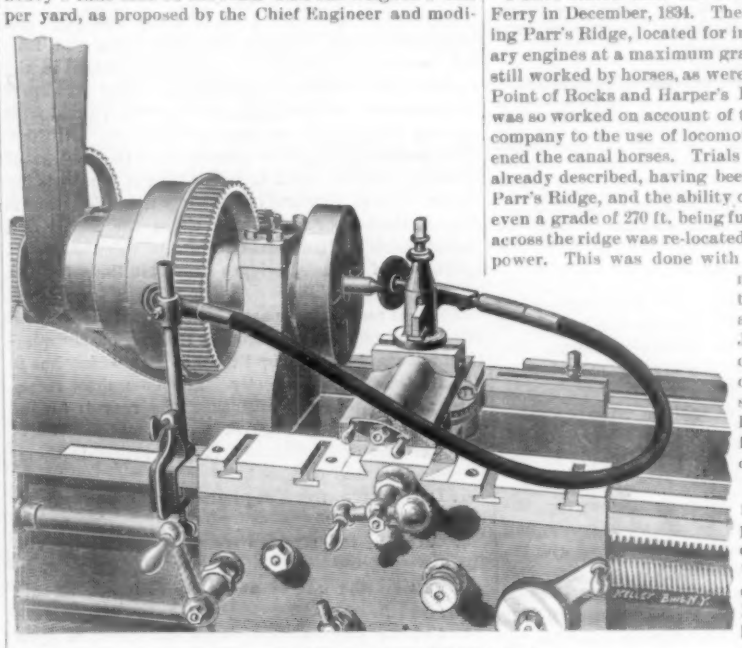
The principal dimensions of the upper bridge will be:

| | |
|---|---|
| Span, centre to centre of piers | 1,680 ft. |
| No. of cables (of steel wire having an ultimate strength of 160,000 lbs. per sq. in.) | 4 |
| Diameter of cables | 24 in. |
| Height of towers above mean high water (masonry 180; steel 100 | 280 ft. |
| Size of towers at bed rock | 168 by 102 ft. |
| Size of towers at high water line | 160 by 60 ft. |
| Depth of stiffening trusses, four in number | 24 ft. |
| Land spans from face of anchorage to centre of pier | 1,020 ft. |
| Width of bridge | 106 ft. |
| No. of tracks | 4 |
| No. of driveways | 2 |
| No. of promenades | 1 |
| Weight of locomotives for which bridge is proportioned | 93,000 lbs. |
| Weight on drivers | 75,000 lbs. |

The span of the lower bridge will be a little over 1,400 ft. from centre to centre of piers.

## The Stow Centre Grinder.

We illustrate a centre grinder for lathes placed upon the market by the Stow Manufacturing Co., of Binghamton, N. Y. It consists of about 3½ ft. of flexible shafting attached at one end to the spindle of a 3-in. emery wheel, turning in a bearing that can be held like an ordinary tool in the post, and adjusted to any desired angle. The other end of the shaft is coupled to the spindle of a friction wheel made to bear against the cone of the lathe, and held in position by a bracket bolted to the bed. In the engraving the surfaces in contact of the centre and emery wheel run in opposite directions, and it is claimed that a centre can be ground true in five minutes. The weight of the apparatus complete, without the bracket, is four pounds, the latter weighing three pounds.



Centre Grinder with Stow Flexible Shaft.

## Building the Baltimore & Ohio Railroad.

ANNUAL ADDRESS BEFORE THE AMERICAN SOCIETY OF CIVIL ENGINEERS BY THE PRESIDENT, MR. MENDES COHEN, DELIVERED AT THE OLD POINT COMFORT CONVENTION, JUNE 8, 1892.

(*Continued from page* 499.)

While the improvements we have noted in the locomotives, and which we have traced down to 1836, were being effected, other departments of the work were progressing. On April 1, 1832, the line was opened to the Potomac River at the Point of Rocks, a distance of 70 miles from Baltimore, and was regularly worked throughout by horse power. As already stated, it had been contemplated to effect, with inclined planes, the crossing of Parr's Ridge, the summit of which was 800 ft. above tide and the eastern foot of which was reached at about 40 miles from Baltimore. The placing of the machinery for working the planes was, however, deferred from year to year and the traffic carried across the ridge by horse power, until the development of the engines already described led to their being tested on the heavy grade of the intended planes.

I have already mentioned that, at the very outset, work along the Potomac was stopped by litigation resulting in favor of the Canal Co.; a compromise was sought and finally effected in the spring of 1833. The immediate difficulty was the passage of the several spurs of the Blue Ridge, which are cleft by the river with bold and rocky slopes and first encountered by the road in the Catoctin Mountain, at the Point of Rocks, and continue at intervals for 12 miles to Harper's Ferry. The compromise arranged need not be considered here. It was onerous enough but could not be avoided, and under it the work was completed to a point opposite Harper's Ferry by December, 1834. During these years of obstruction authority had been obtained to construct a branch road to Washington, and in 1831 Mr. B. H. Latrobe was appointed an assistant and assigned to the reconnaissance. This was followed up without delay by a more definite and careful examination. Mr. Knight takes a most comprehensive view of what he says must become a great national highway. He urges that no grades exceeding 20 ft. per mile, nor any curve of less radius than 1,500 ft. or, in extreme cases, 1,000 ft. be tolerated if avoidable at any reasonable expense, so that light locomotives may make the run regularly in two hours and, indicates the possibility of a "message being made to pass the whole distance from Washington to Baltimore in one hour." The surveys were continued with great minuteness so that, as the President expressed it, "the route finally adopted should leave no better one available to a rival corporation." In July, 1833, Mr. Knight submits his report and analysees of 12 alternative lines with a degree of elaboration and care that I venture to say has rarely been equaled.

The line recommended by him was at once placed under contract and under Mr. B. H. Latrobe, as the Engineer-in-Charge, was completed and opened Aug. 25, 1835. At its point of divergence from the main stem seven miles from Baltimore it crosses the Patapsco by a masonry viaduct of eight arches, each of 58 ft. chord, some 70 ft. in height above the water and of a total length of 707 ft. This was designed by Mr. Latrobe and stands to-day a monument to his taste and professional skill.

The superstructure of the branch road was intended to be a great improvement on the various forms used thus far on the main stem. It consisted of longitudinal sills 6 in. square and from 12 to 40 ft. in length laid in trenches so cut for their reception that the upper surface of the sills will be from 2 in. to 5 in. below the graded surface of the roadbed. On this were laid crossties 4 ft. from centre to centre and cut out to receive stringed pieces of yellow pine 6 in. square, on which were laid the first heavy T-rails used on the road. This rail weighed 40 lbs. per yard, as proposed by the Chief Engineer and modified in the shape of its face or surface by Mr. Ross Winans.

I must now say something of the progress made in coaches, cars and car wheels. The coaches were at the outstart made about as comfortable as the stage coach of the day, and were built on much the same pattern, but, of course, with cast-iron wheels, The "Ohio," of which I am able to show you a lithograph, was an improvement on those which had preceded it. You will see that it is provided with Mr. Winans' anti-friction boxes. So long as horse power alone was used nothing better was required. As soon, however, as the locomotive appeared upon the road, there came with it the necessity for modification in the carriages. The wheels, at first light to save weight, were made heavier, to give needed strength to increased speed. Mr. Knight improved the shape of the tread and flange, while John Elgar and Ross Winans developed its chilled features, and Phineas Davis further improved and perfected the whole by altering the disposition of the metal in the tread and angle of the flange and by introducing within the wheel a wrought iron ring of five-eighths or three-quarters inch round iron, which not only perfected the chill but increased the strength of the wheel. So satisfied was Mr. Knight with the result that he observes at quite an early stage "the cast iron wheel has probably attained the utmost perfection of which it is capable." Thousands of these wheels were made at Mr. Winans' shops, not only for use in various parts of this country, but for some of the German and Swiss roads which used them extensively up to 1851. Mr. Knight in his report for 1836 states that "the chilled wheels have run 30,000 miles and more at the high speed used on the Washington branch without the failure of a single wheel," and he had every reason to believe that 50,000 miles might be accomplished by them.

The increase of speed due to the use of steam made greater steadiness desirable in the coach than was possible in the four-wheeled car. The long stringers and sills for the track, some of them as long as 40 ft., had been heretofore carried over the finished road on two of the ordinary four-wheel platform cars, coupled by a long pole. On the platform of each of these cars there rested transversely a bolster with a vertical pin or king bolt, passing through its middle point and so connected to the platform of the car as to permit the bolster to swivel freely. On these bolsters of the two connected platform cars, and stretching from one to the other, the track timbers referred to were laid. Vertical stakes secured to the ends of the bolsters prevented the timber from rolling off. This contrivance, a very familiar and natural one, and not even then used for the first time, answered its purpose perfectly, and from its steadiness of motion suggested to the active mind of Ross Winans the carrying of passengers on a car constructed on the same principle. His experiments soon followed, and in the annual report of Oct. 1, 1833, the Superintendent of Machinery notes that he is building three car bodies to form one coach on eight wheels to carry 60 passengers. This was the birth of the 8-wheel car which was patented by Mr. Winans, and though the courts, after long litigation, decided adversely to his claim on the ground, I believe, of prior use as in the case of the timber car, and a similar one for transporting large blocks of granite at Qnincy, Mass., yet I have always believed that to Ross Winans we are indebted for this great improvement. Very soon thereafter 8-wheel cars were used throughout the line for both passenger and freight traffic, and special cars were provided for baggage, which had heretofore been carried on top of the coaches.

I have stated that the road was opened to Harper's Ferry in December, 1834. The portion of the line crossing Parr's Ridge, located for incline planes with stationary engines at a maximum grade of 270 ft. per mile, was still worked by horses, as were also the 12 miles between Point of Rocks and Harper's Ferry. The latter section was so worked on account of the opposition of the canal company to the use of locomotives, because they frightened the canal horses. Trials of the new Davis engine, already described, having been made on the planes of Parr's Ridge, and the ability of the engine to overcome even a grade of 270 ft. being fully demonstrated, the road across the ridge was re-located to adapt it for locomotive power. This was done with grades of about 80 ft. per mile, increasing the distance less than one mile, and was put in operation in June, 1839. A pecuniary consideration to the canal company having meanwhile steadied the nerves of their horses, the whole line, as far as completed, was in operation with locomotives.

The increasing demand for these machines was partly met by replacing the engines at work on the Washington branch by others built by Mr. William Norris, of Philadelphia, having horizontal boilers and one pair of driving wheels of 4 ft. diameter, with a truck in usual form, cylinder of 10½ in. diameter and 18 in. stroke and weighing nine tons, with 5½ tons on the drivers. It was a form of engine much better adapted to the fast passenger service of that line, and in its day a most efficient machine. These engines used wood fuel and were followed by others on the same general plan, using the same fuel, which was found less costly than the anthracite coal supplied to the Davis engines.

The crossing of the Potomac at Harper's Ferry was effected by a timber bridge, designed by B. H. Latrobe and built by Wernwag. It was a noted structure in its time, being modeled somewhat upon the plan of a celebrated bridge over the Rhine at Schaafhausen. A peculiarity of the line at this point necessitated a bifurcation of the bridge at its western end forming two branches of a Y; the one arm connecting by a single span to the south with the Winchester & Potomac Railroad then just completed to meet it, the other by two spans to the west, being the prolongation of the main stem of the railroad.

This arrangement involving the use of switches midway of the bridge was necessarily somewhat complicated, but it has continued to this day, although the rapidly increasing weight of the locomotives and trains caused the replacing of the timber bridge at a later date, 1852, by an iron truss patented by Wendell Bollman, the details of which were arranged by Mr. J. Tegmeyer and which has been claimed as the first iron truss railroad bridge.

The extension of the line from Harper's Ferry westward to Cumberland, a distance of 98 miles, was now being pressed forward with his characteristic energy, by Mr. Latrobe, the engineer of location and construction, and was opened to Cumberland in November, 1842. The engineering features do not call for special comment here, beyond reference to the track superstructure, which still adhered to the sub-sill. It consisted of a wooden under sill and stringer piece with cross ties and blocks between them, the whole fastened by wooden pins. The iron rail was of the bridge form, weighing 51 lbs. to the yard, with cast iron chairs at the ends and in the middle of the bars, which were held firmly down to the stringer piece by screw bolts at the ends and hook-headed spikes at intermediate distances; the whole resting on a bed of broken stone one foot in depth.

(*Continued on page* 514.)

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## EDITORIAL ANNOUNCEMENTS.

**Contributions.**—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

**Advertisements.**—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The situation at Homestead as we go to press is told elsewhere. The origin of the trouble is a question of wages and of that we have no opinion to express. But one thing is quite obvious. Society can not afford to admit the right of employés or any one else to seize the property of the employers without "due process of law." So the poor fellows who have struck have, as usual, contrived to put themselves dead in the wrong by taking possession of "Fort Frick." Now the county and state must recover the property and restore it to the owners at any cost, and the taxpayers will have to pay the expense of the reconquest and for the damage done to property. But what folly was all that formidable preparation of loopholed fence and barbed wire and search lights unless it was carried to the logical end by putting a garrison in the fortress. It reminds one of John Phœnix's famous plan for the defense of a fortified place: "I would march out, allow the enemy to enter, then lay siege to the place and reduce it in forty days and forty nights." The enemy has entered the fort which was so carefully arranged for his convenience. It now remains to get him out.

### The Railroad Problem in Chicago.

Chicago has what is called a "railroad problem," which in complexity, extent and intensity beats the "rapid transit problem" in New York and Boston, and the "grade crossing problem" in Buffalo, out of sight. Chicago is the greatest railroad centre in the United States, if not in the world, if we measure it by the number of lines which enter the city and by their mileage. The movement of freight and passengers, and the switching in the city limits, and indeed in densely peopled portions of the city, are enormous. Ninety-five per cent. of the street crossings by railroads are at grade. The main lines of the railroads cross each other at over 100 points, and cross sidings or yard tracks at over 30 points. Lead tracks running into yards cross main tracks or sidings at more than 120 points. There are probably 1,000 or more grade crossings of streets by railroads.* In 1890, 243 persons were killed in the city and 299 in the county at street crossings or on the right of way of the railroads. To be sure most of those killed were trespassers, but it is very urgent to make it hard for folks to trespass on the right of way. Back of all this is the fact that the situation adds much to the cost of operating by the great and growing delay to traffic and the necessary disadvantages under which cars are handled. But the evils of to-day are small compared to what they will be in a few years. With the inevitable increase of population and business the present method of doing the railroad business of Chicago will soon become intolerable.

Of course all this has long been recognized, and many men have proposed plans for helping matters. Indeed the belt lines have already done a good deal to simplify and systematize the movement of freight cars in and about the city, and have taken some of the switching out of the crowded districts; but all that has been done is a trifle to what will have to be done, and no plan yet proposed, if comprehensive enough to meet the difficulty, has had backing enough to carry it out, or really begin to carry it out.

In 1890 the Western Society of Engineers appointed a committee "to investigate and report upon the railway problem of Chicago in relation to terminals, rapid transit, marine commerce and related interests." The committee was made up of R. B. Mason, Benezette Williams, Wm. Sooy Smith, E. L. Corthell, R. P. Morgan, O. B. Green and Isham Randolph. Col. Mason died and was succeeded by H. B. Herr. Most of these gentlemen are known to our readers as men of competent experience and ability to make a valuable study of this great subject. Last May they made their report to the Society and it is published in the May issue of the *Journal of the Association of Engineering Societies.* The reader had better send 30 cents to Mr. J. W. Weston, Secretary of the Association, Lakeside Building, Chicago, and get the report for we shall not attempt to reproduce it even by abstract, but merely to give a synopsis of its contents.

The Committee had a great many meetings and visited Baltimore, Philadelphia, New York and Buffalo, where the methods of distributing freight in the harbors, the elevated terminals and other structures were studied; and looked at the St. Clair Tunnel with especial reference to the drainage problem. At New York especially they were impressed by the system of handling freight to and from the freight terminals by water. The facility and cheapness with which this is done in the harbor and rivers about the island is a factor which is often left out of the calculations of projectors of tunnels, bridges and belt lines for the city.

The first and largest part of the report deals with the marine commerce of Chicago and the harbor question, but we shall take up first that part which has to do with the railroads directly. The committee recognizes as a matter of course that the remedy for the well-known difficulties lies in separating the levels of the streets and railroads, and of the railroads themselves. This may be done by

1. Leaving the streets at present grade and raising the railroads.

2. Carrying the streets over the railroads by viaducts.

3. Putting the streets under the railroads in subways.

4. Putting the railroads under the streets in open cuttings.

5. A compromise of the first and third, raising the railroads part of the necessary total height and lowering the streets at crossings.

The fourth method is the one which the Committee (except Mr. Corthell) evidently favors and is the one treated at greatest length. It would have the great advantage of getting the railroads not only out of the way, but out of sight; and the Committee suggests that it would be feasible to build over the tracks should that be desirable later. It has, however, great objections. The first is the difficulty of draining the tracks that would be below the level of Lake Michigan. The Committee suggests sumps connected with a sewer, which would carry the water to a pumping station. But although the seepage might be limited there would be enormous volumes of surface water to dispose of sometimes. The recent experience in Chicago, when the existing tracks were submerged for miles, is rather discouraging to this project. The question of clearing the cuts of snow and ice is another one that does not appear to have had proper consideration from the Committee. It is suggested that the material taken out in construction could be used in raising street grades. The difficulty of disposing of sewers and water and gas mains under the proposed subways and tunnels are very lightly touched by the Committee.

But there is still another objection to this scheme which is not mentioned. Of course, the tracks into the city must be used for passengers as well as for freight; but the cuttings will be more or less covered, and everybody has learned in recent years the great difficulty of lighting and ventilating tracks so situated. The experience of the New York Central is instructive, and the discussions of the New York rapid transit projects brought out a good deal of information which is not encouraging. The Chicago Committee squints toward electric motors, to be sure, but at best that would be only a partial solution, and in the present "state of the art" it is unwise to base such a gigantic project on an article of faith. Even without the smoke and gas of locomotives an underground journey is not attractive.

The Committee recommends such arrangements that no freight for points beyond Chicago should be handled in the city yards, and recommends the development of the belt systems so as to improve the facilities for interchange.

Finally, the Committee suggests the formation of a Chicago City Terminal Association to which all the terminals should be leased. Groups of yards should be made at or near the city limits. There all freight for Chicago should be turned over to the Association and by it delivered to the consignees. Freight from the city would be first taken out by the Association and then delivered to the railroads at the outer yards. Further it is suggested that much merchandise could be stored in warehouses at the outer yards and sold by sample in the city. Doubtless this last idea will have a great development in other cities in time.

Mr. E. L. Corthell makes a minority report, in which he presents a plan which is very attractive. He proposes that there should be three groups of *elevated* roads, one on the south side, one on the west side and one on the north. The southern group would require a main stem with six to 10 tracks; the others might be smaller. The clear height should be enough to give free street traffic, and the viaducts should be floored with plates and concrete, and the space below used for yards, warehouses, etc. There should be city yards where practicable, and freight and passenger stations of several stories. Cars should be handled to and from different levels in the yards and stations by hydraulic lifts, and hydraulic capstans, turntables, traversers and cranes should be used in the yards and on the docks. He says that in Europe freight is handled by hydraulic plant with a saving of at least 50 per cent., and in many places in Chicago such appliances would save 75 or 80 per cent. The three great elevated passenger terminals could be united by a connecting elevated railroad so that passengers could go from one to the other without the present great inconveniences. The last suggestion will appeal to that great body of travelers for whom Chicago is now only a way station, and who sometimes think that time-tables and connections are made in the interest of Chicago hotels.

That part of the report which deals with the harbor we leave for another issue. We have given but an inadequate synopsis of the railroad part, and are aware that we look at it with only superficial knowledge and judgment; but so far as we know and can judge, Mr. Corthell has pointed out the solution of the hardest part of the Chicago railroad problem.

### Kansas City Traffic.

The report of Kansas City commerce made under the auspices of the Commercial Club of that city is largely occupied by the report on transportation by Mr. A. J. Vanlandingham, the Commissioner of the Kansas City Transportation Bureau, which contains statistics of the receipts and shipments of freight by each of the railroads entering Kansas City. Some of the tables give the figures in considerable detail for the different kinds of freight, and some only the gross amount of all kinds, and there is a suspicious roundness in some of them; but they probably on the whole give the total business pretty correctly; and it will be of interest to see how the different railroads at that important traffic-centre compare with each other in their business, and especially what amount of business the later comers have succeeded in getting. The figures are for the year ending with June, 1891, which was one when the crops to be moved were exceptionally light.

It should be remembered that Kansas City is not the terminus of the Atchison, Topeka & Santa Fe, the Missouri Pacific or the Chicago, Rock Island & Pacific. The latter, however, reports separately its business for its lines east and those west of the Missouri River. The difference is important because the receipts of grain and live stock are chiefly from the lines west of Kansas City, and those of lumber, agricultural implements and merchandise from the lines east of it; but we must do the best we can with the figures we have. Now the receipts and shipments of freight at Kansas City by each railroad during the year ending June 30, 1891, were, in tons:

| | Receipts. | | Shipments. | |
|---|---|---|---|---|
| | Tons. | P c of total. | Tons. | P c of total. |
| Union Pacific | 380,632 | 10.3 | 370,871 | 15.0 |
| Missouri Pacific | 1,021,942 | 27.8 | 370,146 | 15.0 |
| Atch., Top. & Santa Fe | 327,892 | 8.9 | 344,341 | 13.9 |
| Missouri, Kan. & Tex | 25,133 | 0.7 | 106,016 | 4.3 |
| Kan. C., Ft. Scott & Mem | 567,640 | 15.4 | 261,152 | 10.6 |
| Wabash | 132,527 | 3.6 | 193,220 | 7.8 |
| Chicago & Alton | 285,082 | 7.7 | 148,523 | 6.0 |
| Hannibal & St. Jo | 220,212 | 6.0 | 151,654 | 6.1 |
| Kan. C., St. Jo. & C. B. | 250,006 | 6.8 | 163,907 | 6.7 |
| Chic., Rock I. & Pac. | 281,863 | 7.7 | 188,336 | 7.6 |
| Chic., Mil. & St. Paul | 178,135 | 4.8 | 134,160 | 5.4 |
| Chic., St. P. & Kan C. | 12,145 | 0.3 | 38,398 | 1.6 |
| Total | 3,683,212 | 100.0 | 2,472,724 | 100.0 |

The railroads in this table are arranged as nearly as may be from the north, west of the Missouri River, around to the south, east, north and back to the Mis-

* These figures are given on the authority of Mr. E. L. Corthell.

souri; but the great mileage that the Missouri Pacific and the Atchison especially have both east and west of the Missouri prevents this from showing the origin of the traffic as it would do otherwise.

It is for this reason, probably, that the Union Pacific, which next to the Atchison serves the greatest territory which ships eastward to or through Kansas City, appears as having brought there not much more than one-third as much as the Missouri Pacific. But of course Kansas City is not the only nor the chief eastern terminus of the Union Pacific. For the larger part of its mileage Omaha is the most convenient outlet.

The Atchison is situated in many respects like the Missouri Pacific, with a very much greater mileage in the country which ships produce to Kansas City, however. It reports carrying to that city less than one-third as much as the Missouri Pacific and not as much as the Union Pacific, which is, to say the least, surprising. The Missouri, Kansas & Texas is not properly a Kansas city road. It reaches that city over the Fort Scott road, but its natural outlet is rather to Chicago and St. Louis for the larger part of its system. It is seen that it brings less freight there than any other road save the new Chicago, St. Paul & Kansas City.

The Kansas City, Fort Scott & Gulf brings more freight to Memphis than any road which terminates there; but more than half the freight it delivers there is coal and it is the chief carrier of coal to that place. It carries but little grain in that direction.

This exhausts the list of carriers from the west and south to Kansas City, except the trans-Missouri lines of the Rock Island, whose business we have not given separately above, but which amounted to 71,066 tons received and 117,854 tons forwarded last year. Doubtless, however, the Kansas City & Council Bluffs brings there a not inconsiderable quantity of produce from the Burlington's trans-Missouri system, as well as from the country on its own lines.

Of the lines east of Kansas City, and which carry grain, live stock and provisions from it rather than to it, the Missouri Pacific is one of the principal, but its business on that side of Kansas City cannot be distinguished from that on the other side. Of those whose western terminus is at Kansas City, the Chicago & Alton leads in deliveries at that place; but it carries from it less than the Hannibal & St. Joseph, the Kansas City & Council Bluffs (these being Chicago, Burlington & Quincy lines), or the Wabash, which carries more than any other line reporting its eastern business separately. Even over the Milwaukee & St. Paul, a new road, the shipments are nearly as great as over the Alton, and one-seventh more than the eastward shipments over the Rock Island, which has long been in Kansas City and has the advantage of a system west of the Missouri. But it is to be remarked that the eastward movement is not very large on either the Alton, the Rock Island or the Milwaukee & St. Paul. The Chicago, St. Paul & Kansas City closes the procession with 34,400 tons, which, however, is nearly three times as much as it brought to the city. The Alton, it is noticeable, brought twice as much as the Wabash, which has a much greater mileage, a shorter line to St. Louis, and a line to Toledo as well as lines to Chicago and St. Louis, like the Alton. It also brought four times as much as the Rock Island; and as it is not situated so as to bring much produce to Kansas City, we shall be safe in assuming that it gets a very large share of the merchandise freight. It is, next to the Fort Scott, the largest carrier of coal to Kansas City, and this forms about one-third of its freight received there. It has probably suffered like other lines having their western termini at Kansas City, by the three new lines thence to Chicago and especially by the Atchison's line, which has the advantage of several thousand miles of road west of the Missouri to feed it.

The great industry of Kansas City is packing. However much grain is produced in the country west of it, not much stops there, as it is not a milling point, nor is there water transportation to cause transfers as at Chicago, St. Louis and Duluth. The live stock, however, even if not slaughtered at Kansas City, is likely to stop there on the way further east, and it is one of the greatest markets in the world for cattle and hogs. The receipts there of cattle were 236,802 in 1872, but did not reach that number again until 1880. From 1882 to 1886-87 they averaged 495,700, and for the last five years they have been:

| 1886-87. | 1887-88. | 1888-89. | 1889-90. | 1890-91. |
|---|---|---|---|---|
| 542,823 | 732,864 | 1,177,965 | 1,435,761 | 1,243,816 |

While the number slaughtered in Kansas City has been:

| 1886-87. | 1887-88. | 1888-89. | 1889-90. | 1890-91. |
|---|---|---|---|---|
| 144,318 | 272,932 | 413,841 | 511,305 | 499,454 |

Hogs were an important receipt first in 1878, when 427,777 arrived, which was twice as many as the year before. The number grew to a million in 1881, to 2,358,718 in 1885, and fluctuated between that number and 2,028,000 until last year (to June 30, 1891) when it suddenly leaped to 3,035,846.

The receipts of cattle are to an overwhelming extent from the country west and south. The number and percentage of the whole brought by different lines were last year:

| | Number. | P. c. of total. |
|---|---|---|
| Atch., Top. & Santa Fe | 523,527 | 42 1 |
| Missouri Pacific | 200,374 | 16.1 |
| Rock Island (west of Mo. River) | 143,821 | 11.6 |
| Union Pacific | 101,562 | 8.2 |
| Mo., Kan. & Texas | 72,775 | 5.8 |
| K. C., Ft. Scott & Gulf | 58,579 | 4.7 |
| All other lines | 143,179 | 11.5 |
| Total | 1,243,817 | 100.0 |

Thus it appears that the Atchison brought in three-sevenths of all the cattle, the Union Pacific only one-twelfth, the Rock Island, which but recently has entered the cattle ranges, one-ninth, and the Missouri Pacific nearly one-sixth, leaving but 22 per cent. for all the other roads.

Of the much less important shipments of cattle (744,522 head) the Atchison carried 27.5 per cent., the Milwaukee & St. Paul 18 per cent., the Chicago & Alton 11.5 per cent., the Hannibal & St. Joseph 10.6 per cent. The three new roads to the East carried 48 per cent. of the whole number of cattle shipped, so that the growth of the business cannot have done the old roads much good.

The receipts of hogs are more distributed, coming from the fertile, cultivated country, while the cattle come chiefly from the uncultivated plains. The hog receipts by routes were:

| | Number. | P. c. of total. |
|---|---|---|
| Missouri Pacific | 814,065 | 26.8 |
| Atch., Top. & Santa Fe | 508,613 | 16.7 |
| Rock Island (W. of Mo. Riv.) | 319,193 | 10.5 |
| Union Pacific | 305,161 | 10.1 |
| Kan. C. & Council Bluffs | 276,030 | 9.1 |
| Kan. C., Ft. Scott & Mem. | 251,638 | 8.3 |
| Kan. C., Wy. & N. W. | 106,140 | 3.5 |
| Mo., Kan. & Tex. | 100,525 | 3.3 |
| All other lines | 354,481 | 11.7 |
| Total | 3,035,846 | 100.0 |

Of the 782,597 hogs shipped from Kansas City, no less than 33.5 per cent. went by the Wabash, while the Chicago & Alton took 16.8, the Atchison east of the Missouri, 15.8; the Milwaukee & St. Paul, 11.5, and the Hannibal & St. Joseph, 10.6 per cent., leaving but 11.2 per cent., or one-ninth of the whole, for the other 13 routes; but it is really only the lines to the East that compete for it, and those not mentioned above are the Missouri Pacific, which brought more than 894,000 hogs to Kansas City and only 7,800 away from it; the Kansas City & Council Bluffs, which is circuitous in comparison with the Hannibal & St. Joseph for live-stock shipments; the Rock Island, and the new Chicago, St. Paul & Kansas City.

The receipts and shipments of live stock of all kinds in *car-loads* are reported as follows for the principal lines:

| | Receipts. | P. c. |
|---|---|---|
| Atchison, West | 30 335 | 31.1 |
| Missouri Pacific | 20,536 | 21.0 |
| Rock Island, West | 10.539 | 10.8 |
| Union Pacific | 9.468 | 9.7 |
| K. C., Ft. Scott & Mem. | 6.352 | 6.5 |
| K. C., St. J. & C. B. | 5.736 | 5.9 |
| Mo., Kan. & Tex | 4,600 | 4 7 |
| All other lines | 10,056 | 10.3 |
| Total | 97,622 | 100.0 |

| | Shipments. | P. c. |
|---|---|---|
| Atchison, east | 10.628 | 24.7 |
| Mil. & St. P. | 7.856 | 18.2 |
| Chicago & Alton | 5,475 | 12.8 |
| Wabash | 4.749 | 11.1 |
| H. & St. Jo. | 4,688 | 10.9 |
| Missouri Pacific | 2,370 | 5.5 |
| All other lines | 7,208 | 16.8 |
| Total | 42,944 | 100 0 |

Four roads bring 72½ per cent. of the total live stock receipts, and four carry two-thirds of the shipments, and the three new roads carry 45 per cent. of these shipments, though one of them has hardly begun to carry, having had less than 2½ per cent. of them last year. The Milwaukee & St. Paul has a surprisingly large share of the live stock shipments, but not a large total of shipments (less than half a million bushels of grain), and the one new line with a great business is the Atchison. Altogether they have taken enough, however, to reduce materially the business of most of the old lines, especially their eastbound business.

The last number of *Engineering* which we have received contains an article on the New South Wales Railway Commission, giving an account of the origin of the investigation which has been undertaken into the railroad affairs of the Colony. The story, so far as it is given, confirms what we have heretofore said as to the political origin of the squabble. The non-political Commission, of which Mr. Eddy is President, has brought about very important reforms, not the least of which has been to emancipate the railroad service for politics. There, as here, however, the politicians are very reluctant to see power slip out of their hands. Fortunately the affairs of the railroads have been well administered by the Commission. Expenses have been reduced and net earnings increased. However, a member of the Legislative Assembly, Mr. Schey, brought forward serious but vague charges, which he asked to have investigated by a select committee, he and Mr. Eddy each to nominate an equal number of members of the House and Mr. Schey to be chairman. This remarkable method of appointing a committee was not adopted, however, and a Royal Commission was named before which the inquiry has been conducted. So far as we have yet heard the report of this Commission has not been made, but from such evidence as we have seen, some of which has been presented to our readers in earlier issues, it does not seem likely that the effort to oust the Railway Commissioners will be successful.

The French Minister of Public Works has issued orders according to which beginning with June 1, last, only such persons may be appointed locomotive firemen as are French by birth or naturalization, who have a certificate from a railroad surgeon that they are able to distinguish the audible and visible railroad signals and colors, and who pass a technical and practical examination. The technical examination requires a knowledge of the signal code, of the principal parts of locomotives and tenders, and especially of the safety apparatus. The practical tests are in stopping the locomotive, supplying the brakes and in the care of the boiler.

From the same date candidates for the position of locomotive enginman must be French by birth or naturalization, present certificates of normal sight and hearing like those required of firemen, must have served at least six months as fireman (with certain specified exceptions) and stand examinations which show their familiarity with the signal code, the locomotive instructions, the train rules, their capacity to take apart and put together the chief parts of the locomotive and tender; an understanding of the reciprocal relations of the several parts, ability to manipulate the various kinds of brakes used and knowledge of the injuries to which the track is subject and the means of repairing them. The running of several trains must form a part of the practical examination.

The Select Committee of Parliament to which were referred the six bills for electric railroads in London disposed of that for the Great Northern & City Railway before the dissolution. The bill was reported and passed to the third reading in the House of Commons. The bill for the Baker Street & Waterloo Electric Railway was also read a third time. The Committee announced that it would not attempt to proceed this session with the other bills for electric railroads except possibly the Hampstead & Charing Cross bill, and it was considered doubtful whether the two already passed the House could be got through the House of Lords in this session. The Great Northern & City Railroad is for a line 2½ miles long from Drayton Park to Moorgate street. It is to be run in 16 ft. tunnels to take the ordinary rolling stock of the Great Northern. The estimated cost is £1,199,325 for the railroad and £250,000 for hydraulic lifts and electric plant. Messrs. Siemens Bros. are prepared to build electric motors to haul trains of 150 tons. Mr. Alexander Siemens made the remarkable statement that "as a matter of fact a firm in America has made a contract to carry the traffic of the Baltimore & Ohio by electric traction." One great purpose of this line is to accommodate the suburban traffic of the Great Northern. Sir Douglas Fox and Mr. Greathead are the engineers, and, in fact, Mr. Greathead is joint engineer for the six proposed railroads.

Locomotives at the Paris Exposition in 1889 formed the subject of a note recently contributed to the French Society of Civil Engineers by M. Polonceau. It was stated that toward the close of 1889 a special committee was appointed to report upon the locomotives exhibited at Paris during that year. This report has just been completed, and in submitting it to the Society Mr. Polonceau explained that it consists of four main parts, the first of which gives a full account of the French locomotives of standard gauge, with tables of dimensions, etc. The second part similarly relates to foreign standard gauge locomotives; the third gives descriptions of both French and foreign narrow gauge locomotives, engines for rack roads, motor cars for steam street railroads, and embraces also the exhibits in the line of electric traction; and the fourth part goes into a comparison of the various standard gauge French locomotives shown. The whole report is said to be exceptionally thorough and exhaustive, and correspondingly valuable. Two things which are said to be brought out prominently in the report are the remarkable increase in the power of locomotives for both freight and passenger service, and the increase in the number of types of narrow gauge engines, tending to demonstrate the growing importance of the latter.

A decision in regard to the meaning of "maintenance" has just been rendered by the Railroad and Warehouse Commission of Illinois. One road sought to cross the track of another at grade. The law requires all new railroads crossing railroads already in existence to construct and maintain interlocking devices at the crossings. In this instance the old road took the ground that the word "maintenance" included all the expenses

connected with the operation of the interlocking device. The Commission holds that the word "maintenance" has reference simply to the necessary repairs and the renewal of worn parts of the machine, and that it is not to be construed as including the payment of the wages of those operating the plant after its completion.

The principal excitement in certain parts of the west just now seems to be in connection with large shipments of freight whose most prominent office is to advertise the shippers. The Atchison, Topeka & Santa Fe has taken a train of 20 carloads of furniture (from Cincinnati) into Denver for a new hotel, the cars being decorated with streamers and other loud devices. The Big Four, the Vandalia and the Missouri Pacific have been favored with a train of 40 carloads of grain drills which are taken west on "a handsomely printed schedule," which is sent forward as an advertisement, announcing five-minute stops at prominent points. The train runs only by daylight.

## NEW PUBLICATIONS.

*Depreciated Values Table* (for freight cars). By W. W. Barrows, Richmond, Va.; price, $1.25.

This table, based on the prices prescribed by the Master Car Builders' Association, shows at a glance the value of a car when new, and at the beginning of any month thereafter for 14 years, there being columns for each sum, from $100 up to $600, that is liable to be used in settling for cars destroyed. This table is about 24 × 30 in. and can be pasted on a card so as to be quickly available. It is a revision and enlargement of Mr. Barrow's former well-known table.

The author also publishes a table showing, for 5 lbs., 10 lbs., etc., up to 2,268 lbs., what percentage of a ton the given weight is, and there are three columns, for 2,240, lb., 2,268 lb. and 2,000 lb. tons, respectively. The price of this is 20 cents.

## TRADE CATALOGUES.

*The Wagner Palace Car Co.* has issued a handsome pamphlet describing its works and the different types of cars which the company runs. It contains some exceedingly beautiful pictures of the interiors of the cars, and gives plans showing the arrangement of the seats.

## Building the Baltimore & Ohio Railroad.

(*Continued from page 511.*)

A marked stage in the development of the engines for this extension must now be noticed. In 1836 Ross Winans constructed two engines for the road with the Cooper vertical boiler and with the cylinders placed horizontally at the rear end of the frames and connecting by the spur wheel and pinion through the independent shaft to four driving wheels as in the "Grasshopper" engines. This arrangement enabled the boiler to be depressed, and lowered the centre of gravity of the whole machine some 12 in., thereby giving greater stability at high velocity. This plan was further developed in 1842 in seven engines built for the Western Railroad of Massachusetts, which had eight drivers instead of four. These were powerful engines, but were not a success. They were entirely unsuited to the use of wood, and as anthracite could not be furnished on that line at any reasonable price, the engines were soon laid aside.

On reaching Cumberland, the Baltimore & Ohio Railroad tapped for the first time the bituminous coal region and a locomotive was wanted to burn that fuel. Mr. Winans, to meet this demand, designed an engine with horizontal boiler and horizontal cylinders of 16 by 22 ins., connecting with eight driving wheels 33 ins. in diameter, through a spur wheel and pinion as heretofore, and weighing 23½ tons. Twelve of these engines were placed in service between 1844 and 1846 and were a great advance upon anything which had preceded them. They burned bituminous coal and handled the coal trade in its incipiency. They led the way in the development of the coal burning engine, the next step in which was the building in 1847 by Mr. Winans of four engines for the Philadelphia & Reading Railroad with horizontal boilers, horizontal cylinders and eight driving wheels of 46 ins. diameter, the use of spur gearing being dispensed with. I mention these engines, for they have no equivalent on the Baltimore & Ohio Railroad, and yet mark the stage to the next machine known as the "Camel."

The first of this class of engipes was placed on the road in 1848 in response to specifications prepared by Mr. Latrobe, and limiting the weight to 22 tons. It had 17-in. cylinders of 22-in. stroke, placed horizontally, and eight 43-in. drivers; the firebox was larger aad wider than ever before. In distributing the weight of this engine on its four pairs of driving wheels it became necessary to remove the large dome from over the firebox to a point well forward of the middle of the boiler, where also the throttle valve and engineman were placed. This humped feature suggested the name "the Camel," which was given to the first engine of this form, and the name has since adhered to the type. These engines were developed in the next few years by increase in size of boiler, firebox and cylinders which latter were 19 × 22 in., with a total weight of engine of 28 tons. They were most efficient and enabled the heavy grades of the new road west of Cumberland to be worked successfully. In fact they were designed for these grades and there was no other engine then available for the purpose. This engine has been further developed and improved upon since, largely in the shops of the Philadelphia & Reading Railroad, to which road many of them were supplied, where its crudities have been removed and its deficiencies supplied by the skill of the several engineers of machinery of that great corporation, notably by the late James Milholland and by Mr. J. E. Wootten. But many of its characteristics and important features can readily be traced—the horizontal cylinders; the large and wide firebox; the flat connecting and side rods, the latter arranged with fixed bushings incapable of adjustment, a feature much reviled at the time, but now recognized and adopted by the best builders.

The progress of the road beyond Cumberland was delayed for five or six years by many and peculiar causes. While the original charters granted by Maryland and Virginia were perpetual, yet there were limitations as to time of completion which were already exceeded and which now operated to require further legislation, while a limitation in the Pennsylvania charter operated to annul it altogether. Maryland had a very large amount of money invested in the canal, which had not yet reached Cumberland, where it now rests, and still cherished the hope of its further extension, so that the railroad location must still be subservient thereto. Virginia endeavored to couple with her grants of extended time onerous stipulations limiting the terminal point to Wheeling. The railroad company would have preferred to locate its line to a more southern point on the Ohio, preferably to Parkersburg, at the mouth of the Kanawha, and was not insensible to the advantages of a terminus at Pittsburgh, but was evidently averse to Wheeling. The well known diplomatic skill of President Louis McLane had full scope in reconciling the difficulties, and with some measure of success, for though the act of Virginia, of March, 1847, stipulated Wheeling as the terminus, yet the conditions were less onerous than certain earlier acts, under which the company declined to proceed. It contained a section which seems to have been designed to facilitate connection with a branch to Parkersburg. This was so promptly availed of that the Northwestern Virginia Railroad, now the Parkersburg Branch Railroad, was well under way before the road was opened to Wheeling, and was completed a few years thereafter.

The definitive location of the whole line from Cumberland west was now pushed forward by numerous parties. At the west end three alternative lines of approach to the Ohio presented themselves after avoiding the southwest corner of Pennsylvania, distant from Wheeling some 40 to 50 miles. The first reached the Ohio at the mouth of Fish Creek, the most southern point permitted by the Act of 1847 and then followed the river 25 miles to Wheeling. The next touched the river at the mouth of Grave Creek, 12 miles below Wheeling. The third via Wheeling Creek only reached the river at the city of Wheeling. The first although the longer had light grades and no heavy work, and was the choice of Mr. Latrobe. The second and third crossed several divides involving much heavy work, each of the two including Braid Tree Tunnel of 2,300 ft. with 80 ft. grades on either side.

Wheeling, fearing an attempt to deprive her of the benefits of the actual terminus, protested against the adoption of the Fish Creek line, as contrary to the spirit of the Act of 1847, and of a subsequent agreement between the city and the company. She called to her aid Jonathan Knight and Charles Ellet, Jr., as engineer experts. Mr. Knight had resigned from the Baltimore & Ohio Railroad, and had been succeeded by Mr. Latrobe in 1842, about the time of the completion of the road to Cumberland, and now brought all the knowledge and skill acquired in the company's service during his 15 years' connection with it, to bear in opposition to its plans and to the views of its chief engineer, his former assistant.

The situation may well have been embarrassing to Mr. Latrobe, whose notions of professional ethics were, I take it, of a different order. It will be too long a story to enter here into the details of the controversy. It was skilfully managed on both sides. Reams of paper were filled with the calculations and discussions of the engineers, and with the arguments of counsel, among whom were Daniel Webster, Reverdy Johnson and J. H. B. Latrobe. The matter was finally adjusted by arbitration in the autumn of 1850, resulting in the adoption of the Grave Creek line, having caused a further delay of three years.

The questions of location having been settled, the construction of the 200 miles from Cumberland to Wheeling was pressed at all points with energy by able assistants. Wm. H. Small, George Hoffman, Thomas Rowles, James L. Randolph, George McLeod, Charles P. Manning, Benjamin D. Frost, Alfred F. Sears, and Albert Fink, the latter a Past President of the Society, are names most of which are familiar to you.

The track from Cumberland westward was laid throughout with 60 lb. rails on cross ties, with a wrought iron H or lip chair of boiler plate. The latter, though better than anything which had preceded it, was very unreliable. The graded road was ballasted ahead of the track with broken stone, sand or gravel, as might be obtainable. The track was not yet perfect, but a great step in advance was made, when there was no longer a sub-sill to churn away the mud beneath a real or pretended ballast.

Mr. Latrobe's adoption of the 116 ft. grades in crossing the mountain was deemed bold and hazardous, but he had been trained in a school which was self-reliant. He made his calculations of what he required and what he felt sure could be accomplished and found in Ross Winans the man who recognized the occasion and undertook the task of designing an engine that should perform the work. Well do I remember accompanying Mr. Winans on his first test of the new engine on the grade for which it was designed. The occasion was the opening of the new road in July, 1851, to Piedmont station, 28 miles west of Cumberland. Here begins the 116 ft. grade, which continues for 17 miles to the top of the Alleghany Mountains. The track laying force was busily engaged some three or four miles beyond, and this short distance was all that was available to see what the engine could do. As a test of its full power it did not amount to much, but there were attached to the engine in addition to the passenger cars of the excursionists, a number of carloads of iron rails, all that were available, and with these the engine started at the foot of the grade and made its run at the rate of 10 or 12 miles an hour with a large surplus of steam, which was cut off at half stroke. On arriving at the end of the track with steam blowing off, there was much congratulation. It was realized that the question of ability to work this grade, of which great doubt had been expressed, was clearly demonstrated, with a large reserve of power in the engine, and from that time forward no more was said of impossibilities.

In the following winter and spring the track was carried to and across the slopes of Cheat River. Here the deep ravines of Tray Run and Buck Eye Hollow were crossed on grades of about 105 feet to the mile, at an elevation of 160 feet above the bed of the ravine by trestle work soon replaced by permanent structures, the detail of which was executed by our past President, Albert Fink, then assistant to Mr. Latrobe.

The next great feature was Kingwood tunnel, of 4,100 feet in length. This work not being ready in time to pass the track layers through without much delay, Mr. Latrobe determined to grade a track over the tunnel and passing the iron over it, to continue the work of track laying beyond. The maximum grade involved in this was 10 ft. per hundred, which, though intended for horse power, was worked by the Camel engine, which pushed over it one car of rails without any serious difficulty. At a later period, after the opening of the road, when the arching of the tunnel was in progress, this temporary line was revised with a maximum grade of 5½ and the whole traffic of the road was carried over it for some months.

The crossing of this tunnel effected, the progress of the road lay on easier lines for some 80 miles. The Monongahela River was crossed by a bridge of three spans of 200 ft. each. The masonry of the piers and the abutments of this bridge were intrusted to our late member, Mr. James L. Randolph, who was the Division Engineer, the superstructure being designed by Mr. Fink. At Board Tree tunnel, about 164 miles west of Cumberland, was encountered another temporary delay by reason of the failure or inefficiency of the contractors. Here Mr. Latrobe again determined to avail of a temporary crossing over the top of the hill. This time the maximum gradient was six per cent. The crossing was effected by a series of zigzags, or switchbacks, two on one side of the hill and five on the other. The topography was such that there were two curves on the line of 180 degrees, and more of continuous curvature in one direction; the limiting radius was 300 ft. Mr. Latrobe has himself so well described this crossing that I will not repeat it here at length. This temporary road was most successfully worked for some five or six months.

Beyond this point for 36 miles to its terminus at Wheeling there are no features of special interest which I now recall. The last rail completing the track to that point was laid on the eve of Christmas, 1852, and early in the next month, January, 1853, the formal opening of the road to Wheeling took place.

And now, ere I close an address which has, I fear, already trespassed too much on your patience, I will say a word or two of the man who brought this great work to a conclusion. Mr. Latrobe was identified with the Baltimore & Ohio Railroad almost from the very beginning. He had been intended for the law, but after completing his course of study and being admitted to the Maryland bar, concluded that railway engineering was more to his taste. He entered the service as an assistant to Mr Knight, and I am quite satisfied that Mr. Knight in all his career never had a more faithful one. None could have been more loyal than he, and when he was no longer an assistant, but himself the chief, his modesty was as marked as before. While his was the mind which planned and directed all, one might have supposed that the idea emanated from the assistants, so ready was he to give them credit for their well executed details. He took pride in the work with which he had been so long identified. He never could have accepted a retainer to oppose its interests whether he was on its pay-roll or not. He left behind him in that portion of the Baltimore and Ohio Railroad which he built a monument to his professional skill, and in the hearts of his assistants a loving remembrance not soon to be effected.

## Riot at the Homestead Steel Works.

On Wednesday morning the idle workmen at the Homestead Mills of the Carnegie Steel Company fired on the guards sent to eject them from the premises, and caused the death of 20 or more men. Nine of the sheriff's men and 11 of the mob were killed and many more injured, the methods of the mob being characterized by fiendish cruelty.

The depression in the iron trades, which has thrown thousands of men out of work, has been the cause of a good deal of excitement at the Homestead works for some time, the Amalgamated Association of the employés being strongest there. The negotiations regarding prices were finally stopped on June 30 by the shutting down of the works, the firm discharging all the employés, and thus forestalling a possible strike by a lockout. On the next day the workmen took control of the works, and in fact the village, as will be seen by the following statement given out July 6 by the Carnegie Company:

"Our Homestead Steel Works were on July 1 taken possession of by a mob, which was immediately thereafter organized by the local representatives of the Amalgamated Association of Iron and Steel Workers, and all our mechanics, mill men, and even foremen and superintendents of departments were forcibly denied admission thereto. We were also notified by a self styled advisory committee that no fires would be permitted at the works, lest the men become excited to further unlawful acts. This continued until yesterday, when we called upon the sheriff of Allegheny County for protection and assistance in regaining possession of our property. The sheriff went to Homestead, and on his return sent deputies to the works, and posted a proclamation, ordering the men to disperse. His deputies were routed, and his proclamation torn down. The sheriff then through his chief deputy, attempted to take 300 of our watchmen [Pinkerton's men], who were sent to the works by boats last night. These men were met more than a mile below the works by an armed mob of Amalgamated men, who followed along the river bank, and fired rifles and revolvers at the boats. . . ."

According to the *American Manufacturer* there are three questions at issue:

1. A reduction in the minimum of the scale from $25 to $23 for 4×4 Bessemer billets.

2. A change in the date of the expiration of the scale from June 30 to Dec. 31.

3. A reduction in tonnage rates at those furnaces and mills where important improvements have been made and new machinery has been added that has greatly increased their output and consequently the earnings of the workmen. Where no such improvements or additions have been made no reduction in tonnage rates is asked.

When the works were shut down the idle workmen, 1,000 strong, formed a guard around the works, and, in fact, around the town, for the purpose of keeping out non-union workmen, and they maintained a picket line night and day. The excitement increased day by day but was subdued, and the reporters could get little accurate information until on Tuesday of this week when, the firm having called upon the sheriff for officers to protect its property, the advisory committee of employés dissolved and destroyed its records. This was followed on Wednesday morning by the riot, in which 20 men were killed, a boat load of Pinkerton men, under the lead of sheriffs, having been resisted when they attempted to land at the Homestead Mills about four o'clock in the morning.

The Homestead *News* says that the rupture was precipitated by a change in the organization of the works It says:

. . . But a new and totally unlooked for change in the organization of the steel firm took place. W. J. Abbot, chairman of the firm, retired. Mr. Carnegie himself withdrew from active participation in the direction of affairs. The firm of Carnegie, Phipps & Co. became a thing of the past, and a new organization, to be known as the Carnegie Steel Co., came upon the scene, with H. C. Frick as chairman. The attitude of Mr. Frick towards organized labor was well known, and from the fact that he was to assume control when the old scale would expire led the Amalgamated Association to expect the worst. When the Amalgamated Association met they reviewed the scales formulated by the Homestead lodges and approved them. Then came the conference in Pittsburgh last week. Mr. Frick was disposed to be arbitrary and left the room. Mr. Potter tried to bring about harmony, but it soon became apparent that the trouble was not a disagreement over wages, but a design upon organized labor. Mr. Frick peremptorily declared the conference at an end. When the convention adjourned the matter was left to the Homestead lodges. . . .

## A Forecast of the New Railroad Building in 1892.

Information received since our table, published July 1, showing the lines on which track had been laid in 1892, changes slightly the figures then given. Track has been laid on the following new road, in addition to those lines published last week:

Bellefonte Central.—Extension to State College, Pa., 1.75.
Bellingham Bay & Eastern.—Near New Whatcom, Wash., 3.
Burlington & Missouri River.—West to Wauneta, Neb., 6.
Chickamauga & Durham.—Near Chickamauga, Ga., 8.
Findlay, Ft. Wayne & Western.—West to Mackinaw, O., 13.
Keystone.—Near Gardeau, Pa., 2.
Northern Pacific.—On Chicago Central, in Chicago, 9.2.
Plymouth & Plymouth.—Plymouth to Middleboro, 15.
St. Louis & Hannibal.—Perry Junction to Perry, Mo., 18.
Sandusky & Columbus Shore Line.—South of Bellevue, O., 6.
Southern Iowa.—To mines at Pekay, Ia., 2.5.
Tionesta Valley.—On Wolf Run Branch, Pa., 2

The track reported laid in Florida, on the Stark & Sampson City road, five miles, is to be deducted, so that the new total for the United States is 1,284 miles.

Supplementing the record of track laid, we give in this issue a compilation in which an attempt has been made to show where more or less new railroad building is likely to be done in the last half of 1892. The lines included in the statement are those upon which work has been begun or is under contract, lines located, and, in a few cases, lines not located, where the information now at hand seems to indicate that considerable work will be done in the next few months. We have been pretty conservative as to the lines to be included in this list, but with all the care possible it must be regarded as somewhat a matter of opinion whether many lines ought or ought not to be included in the list. We have not made a total of the road being built in each state, for the figures would have no statistical value as showing how much new track might be built in the year.

NORTHERN STATES EAST OF THE MISSISSIPPI.

*Maine.*

Bangor & Aroostook.—Brownville, northeast to Presque Isle, 135 miles; located; 10 miles under contract, balance probably in 1892.
Boothbay Harbor.—Boothbay to New Castle, 13 miles; grading to begin in 1892.

*New Hampshire.*

Concord & Montreal.—End of track near Randolph, east to Berlin Falls, 11 miles; Jefferson Station to Jefferson Hill, 3 miles under construction.
Concord & Montreal, on Exeter & Amesbury.—East Epping, south to Exeter, 8 miles; surveyed in 1891. On New Boston.—Parkers to New Boston, 5 miles; surveyed in 1891.

*Massachusetts.*

Southbridge, Sturbridge & Brookfield.—Brookfield to Southbridge, being located, 13 miles.

*New York.*

Adirondack & St. Lawrence.—On main line, from end of track north of Old Forge, northwest to near Lake Lila, 31 miles, and on northern section from end of track above Saranac Lake, near Rainbow Lake to Loon Lake, 14 miles, a large force completing grading and track being laid.
Brooklyn (Elevated).—Seaside, Brooklyn, to Brooklyn Boundary, 6 miles; location made.
Croton Valley.—Croton Landing, N. Y., to near Edgefield, Conn., 25 miles; located in 1891.
Lehigh Valley, on Geneva & Van Ettenville.—End of track at Lodi south to Burdett, 11 miles.
Little Falls & Dolgeville.—Little Falls to Dolgeville, 11 miles; tracklaying begun in June, 5 miles now finished.
Long Island, on New York Bay Extension.—Hempstead Crossing, south, to Valley Stream, 6 miles; partly graded; work now suspended.
New York Central & Hudson River, on Gouverneur & Oswegatchie.—Gouverneur, east, to Edwards, 12 miles; under construction.
Niagara Junction.—Niagara to Niagara Falls, 6 miles; to be built by Cataract Construction Co. over its own property.

*New Jersey.*

Rockaway Valley.—Track to be laid in August from end of track, near Morristown to Morris Plains, 2 miles.

*Pennsylvania.*

Altoona, Clearfield & Northern.—Doughertys to Coalport, 8 miles; located.
Baltimore & Ohio.—Uniontown, Pa., south to Morgantown, W. Va., 22 miles; under construction.
Bloomsburg & Sullivan.—Jameson City to Gonaga Lake, 13 miles; located.
Buffalo, Rochester & Pittsburgh:
Clearfield & Mahoning.—Dubois east to Jefferson Line, 27 miles under construction. Johnsonburg & Bradford.—Howard Junction to Bradford, 20 miles, 1,000 men working on grading.
Hunter's Run & Slate Belt.—Pine Green Furn. to Slate Belt, 6 miles, surveyed.
Newport & Sherman's Valley.—Blain southwest to New Germantown, 5 miles, located and survey made to Broad Top coal fields, 50 miles.
Oregon & Texas.—Cammal to English Centre, 8 miles, under construction.
Pennsylvania.—Philadelphia to Fort Washington, 5 miles, under construction.
Perry County.—Track now being laid from Green Park southwest to Loysville, 5 miles.
Philadelphia & Northeastern (Elevated).—Near Market street north to Amber street, Philadelphia, 2.5 miles. Ordinance passed councils; a little work done on company's own property.
Philadelphia & Reading, on Philadelphia & Northern.—Wister Station to Glenside, 7 miles under construction.
Pittsburgh & Lake Erie.—Fuller to Fayette City, 5 miles, surveyed.
Reading, Lancaster & Baltimore.—Mohrsville near Reading south to Adamstown, 8 miles under construction and contract let from Adamstown southwest to Perryville, Md., 62 miles.
Wilkes-Barre & Eastern.—Wilkes-Barre east to Stroudsburg, 60 miles, under contract.
Western Maryland, on Potomac Valley.—Porter's Station north to York, 15 miles, under construction.

*Ohio.*

Baltimore & Ohio, on Snow Fork & Hocking.—Coal branch, Rock Run, south about 15 miles to coal fields, terminals not fixed.
Cleveland Belt.—Cleveland to West Cleveland, six miles under construction; being built by Cleveland, Canton & Southern.
Dayton, Lebanon & Cincinnati.—Centreville, north to Dayton, 13 miles, located.
Findlay, Fort Wayne & Western.—Extension Mackinaw, O., west to Ft. Wayne, Ind., 30 miles; wet weather has interfered with grading.
Pennsylvania, on Toledo, Walbonding Valley & Ohio.—Walbonding, north to Loudonville, 30 miles under construction.
Pittsburgh, Akron & Eastern, on Akron & Eastern.—Akron, O., east to Newcastle, Pa., 70 miles, located.
Sandusky & Columbus Short Line.—Near Bellevue, south to Columbus, 95 miles located; small force working south of Bellevue.

*Indiana.*

Goshen Lateral.—Goshen to Hydraulic Canal, 3 miles; right of way secured.
Wabash, on Montpelier & Chicago.—Montpelier, O., west to Hammond, Ind., 154 miles, under construction and tracklaying just commenced.

*Illinois.*

Chicago & New Orleans.—Graded in 1891, Farina south to Inka, 16 miles.
Jacksonville Southeastern.—Havana north to Collins, 7 miles, under contract, and located northeast to Rock Island, 100 miles; on Chicago, Greenville & Southern, Greenville to Durley, 4 miles under contract; from Durley to Carlisle 20 miles, surveyed, but the line will only be built to Durley at present.
Peoria & Eastern.—Danville West, 2 miles.
Wabash, Chester & Western.—Tamaroa north to Mt. Vernon, 22 miles, under construction.

*Michigan.*

Chicago & West Michigan.—Branch, Charlevoix to Ironton, 4.5 miles.
Iron Range & Huron Bay.—Huron Bay to Champion, 23 miles, under construction. Tracklaying will begin again this month.
Lowell & Hastings.—Freeport to Hastings, 8 miles surveyed.
Milwaukee & Northern.—Sagola to Sidnaw, 50 miles under construction, contract having been let in June.

*Wisconsin.*

Ahnapee & Western.—Casco northeast to Ahnapee, 32 miles, nearly all graded, tracklaying will begin in July.
Bayfield & Great Western.—Bayfield to Iron Range Station, 18 miles, located.
Goodyear, Neillsville & Northern.—McKenna to Williston, 12 miles, surveyed,
Milwaukee & Superior.—Sussex to North Lake, 8 miles, surveyed.
Minnesota & Wisconsin.—Woodville to Emerald, 16 miles under contract.

SOUTHERN STATES EAST OF THE MISSISSIPPI.

*Maryland.*

Baltimore Belt.—Camden street, Baltimore, to Bay View Junction, 7 miles, tunnel work, nearly completed. Controlled by Baltimore & Ohio.
Lancaster, Oxford & Southern.—Childs Station to Providence Mill, 5 miles, under contract.
Western Maryland.—Arlington Station to Colgate, 10 miles; located in 1891. May be built this year.

*Virginia.*

Buckingham.—Arvon south to Rosney, 16 miles, under contract recently.
Gladeville.—Wise C. H. north to Gladeville, 15 miles, near Big Stone Gap, being surveyed.
Lynchburg Belt.—At Lynchburg, 3 miles, under construction.
Marion & Rye Valley.—Marion to Mines, 7 miles, under construction.
Norfolk & Western.—Belt line at Roanoke, 6 miles, under construction; Ivanhoe to Speedwell, 18 miles; branch up Russell Creek, 2 miles; Coeburn to coal mines, 2 miles, all under construction.
Roanoke, Fincastle & Clifton Forge.—Fincastle south to Cloverdale, 11 miles, nearly all graded in 1891; proposed to begin tracklaying shortly.

*North Carolina.*

Asheville & Craggy Mountain.—End of track near Asheville to top of Summit Mountain, 2 miles, located.
Brunswick, Western & Southern.—Southport north to Wilmington, 20 miles, being built by day's labor.
Cape Fear & Yadkin Valley.—Mt. Airy north to Virginia State line, 7 miles, graded in 1891; work suspended.
Carolina Mining & Mfg. Co.—Sylvia to Webster, 4 miles, partly graded in 1891.
Concord & Southern.—Concord south to Monroe, 32 miles, surveyed.
Norfolk, Albemarle & Atlantic.—Jackson to Albemarle, 35 miles, surveyed in 1891.

*South Carolina.*

Pickens.—Easley to Pickens, 9 miles, located.

*Georgia.*

Georgia Southern & Florida:
Macon & Atlantic.—Near Bruton east to Colleton, north of Savannah, 85 miles. Macon & Birmingham.—La Grange west to Birmingham, both roads partly graded in 1891. Work now suspended and roads in Receiver's control.
Macon, Dublin & Savannah.—Ockmulgee River to Dublin, two miles, under construction. Dublin east to Savannah, 110 miles, located; some construction may be done in 1892.
Middle Georgia & Atlantic.—Machen northwest to Covington, 37 miles, and Newborn north to Social Circle, 10 miles, partly graded in 1891; some track will probably be laid on Covington line in 1892.
Tallapoosa Lumber & Manufacturing Co.—Near Tallapoosa, five miles under construction, but work progressing very slowly.

*Alabama.*

Alabama Grand Trunk.—Graded, Montgomery north to Tallapoosa River 11 miles, tracklaying to begin in a few weeks.
Central of Georgia on Mobile & Girard.—Graded in 1891 from end of track at Theba south to River Falls, 11 miles, work suspended since December, 1891.
Gurleys & Paint Rock Valley.—Gurleys up Paint Rock Valley, 30 miles, under construction, 5 miles completed.
Isbell & Iron Mountain.—Isbell to Iron Mountain 6 miles, partly graded, contract let to complete work.
Montgomery, Tuscaloosa & Memphis.—Montgomery northwest to Tuscaloosa, 105 miles, partly graded in 1891, work now suspended.
Nashville, Chattanooga & St. Louis, on Tennessee & Coosa.—Tennessee north to Huntsville, 14 miles located, will soon be under contract.
Tennessee River, Ashville & Cocsa.—Tennessee River to Ashville, 10 miles, located.
Tredegar Mineral.—Extension of one mile into Jacksonville being built.

*Florida.*

Arcadia, Gulf Coast & Lakeland.—Lakeland southwest to Braidentown, 67 miles under contract.
Gainesville, Rocky Point & Micanopy.—Gainesville to Micanopy, 12 miles, partly graded, work suspended.
Jacksonville, St. Augustine & Halifax River.—Daytona south to New Smyrna, 16 miles. Under contract.
Wekiva, Bronson & Northwestern.—Bronson northwest to Franklin, 35 miles, under construction. Being built by Suwannee River Phosphate Mining Co.

*Tennessee.*

Bristol, Elizabeth & North Carolina.—Track now being laid from Bluff City south to Elizabethton, 15 miles, 11 miles of track having been built in 1892 to Bluff City, south of Bristol.
Harriman Coal & Iron.—Emory River, north to Brushy Mountain, 15 miles, under construction, work delayed by right of way disputes.
Louisville & Nashville.—On Clarksville Mineral-Marion to Van Leer, seven miles, under construction, completing line from Pond Station, near Dickson, south to Clarksville, built in 1891.
Nashville & Knoxville.—All Good east to Standing Stone, 13 miles, located in 1891 and under contract.
Paducah, Tennessee & Alabama.—Hollow Rock south to Lexington, 28 miles, to connect with Tennessee Mid land, located this year, and now under contract.
St. Louis & Birmingham.—Clifton south toward Florence, Ala., 65 miles, reported under construction.
Watauga Valley.—South Watauga to iron ore mines, five miles, partly graded.

*Kentucky.*

Newport News & Mississippi Valley.—On Ohio Valley, 8½ miles southeast of Tracey's, end of track laid in 1892, to Hopkinsville, 2 miles.
Owensboro Falls of Rough & Green River.—Fordsville south to White River, 10 miles; new location made in 1892.
Richmond, Nicholasville, Irvine & Beattyville.—Extension Irvine east to Beattyville, 35 miles, partly graded in 1891, before the receivership, work now suspended. The court this year ordered estimates to be made of cost of completing line, but nothing further was done.

*West Virginia.*

Beaver Creek.—Davis north to mouth of Stoney River, 20 miles being built by day's labor.
Cairo & Kanawha Valley.—Hughes River south toward Grantsville, 18 miles being built by day's labor.
Charleston, Clendennin & Sutton.—Charleston to Clay County line, 10 miles, under construction.
Chesapeake & Ohio.—Rush Run to Butcher's Branch, 11 miles; Nuttall to Wathrow's Mills, 6 miles; and Gauley to 20-Mile Creek, 9 miles, under construction.
Kanawha & Elk River.—Kelly's Creek to Kanawha County, 12 miles, under construction.
Kanawha & Michigan.—Malden south to Gauley River, 32 miles, under construction.
Norfolk & Western, on Ohio & West Virginia Extension.—To complete road between Elkhorn and Ohio River, between ends of track, mostly on middle sections, about 50 miles, nearly all graded.
Ohio River.—Guyandotte to Huntington, two miles.
West Virginia & Pittsburgh.—Erbacon, south of Flatwoods, to which track was laid in 1892, south to Camden, 18 miles, under construction.

NORTHWESTERN STATES.

*Iowa.*

Burlington, Cedar Rapids & Northern.—Forest City west to near Estherville, 45 miles, under construction.
Chicago, Fort Madison & Des Moines.—Libertyville, west to Ottumwa, 22 miles, under construction.
Iowa Central.—Hedrick, south to Ottumwa, 10 miles, located; will be put under contract when subsidy is raised by Ottumwa.

*Minnesota.*

Brainerd & Northern Minnesota.—Located Brainerd, north for 25 miles.
Duluth & Iron Range.—Allen Junction to West Canton Mine in Mesaba Iron Range, 15 miles, under construction.
Duluth, Mesaba & Northern.—Stony Brook north to Grant, 50 miles, and branch from main line to Merritt, 15 miles, under construction; tracklaying begun.
Duluth, Mississippi & Northern.—Mississippi River, northeast, 15 miles, under contract, and located northeast, for 25 miles.
Duluth Transfer.—Cliff avenue, Hazlewood to Garfield avenue, Rice's Point, 1 mile; West Duluth to Ironton, 3 miles; Ironton to Fon du Lac, 6 miles, and Rice's Point to Duluth, 2 miles.

*South Dakota.*

Dakota, Wyoming & Missouri River.—Rapid City west to Missouri River, 100 miles, located and contract let for part of the distance in 1891, but little work done. Reported that grading will soon be resumed.
Duluth, Pierre & Black Hills.—Faulkton southwest to Blunt, near Pierre, 60 miles; located; road graded, Aberdeen southwest to Faulkton.
Rapid City, Missouri River & St. Paul.—Rapid City to Pierre, 165 miles, located; some work done in 1891.
Watertown, Sioux City & Duluth.—Watertown, S. D., north to Wapeton, N. D., 120 miles.
Yankton, Norfolk & Southwestern.—Yankton, S. D., south to Norfolk, Neb., 49 miles, located, contract let this month.

*North Dakota.*

Minneapolis, St. Paul & Sault Ste. Marie.—Valley City north to Dakota state line, 75 miles; Merricourt, west 10 miles; both lines under contract.

*Wyoming.*

Chicago, Burlington & Quincy.—Ou Burlington & Missouri River Railroad.—West of Gillette northwest to Buffalo, 70 miles under construction.

SOUTHWESTERN STATES.

*Louisiana.*

Louisiana Nickel Plate.—End of track, near Allendale, north toward Believue, 4 miles.
New Orleans & Northwestern.—Bastrop north to Collins, 7 miles under contract; from Rayville northwest to Bastrop, located.
Natchitoches.—Natchitoches north to Red River, 5 miles; contract to be let this month.

*Arkansas.*

Southern Arkansas.—From near Dry River south through Calhoun County toward Hampton, 10 miles, company work.
Pine Bluff, Monroe & New Orleans.—Swan Lake northeast to Bayou Meta, 6 miles, surveyed.
Bunkley, Helena & Indian Bay.—Pine City south to Indian Bay, 12 miles, surveyed
Hope & Lewisville.—End of track to Hope, 16 miles, some work done in 1891.
Hoxie & Pocahontas.—Hoxie north, via Pocahontas, to the state line, 35 miles, under contract to Pocahontas and about 5 miles graded.
Kansas City, Arkansas & New Orleans.—Hazen south to Stuttgart, 22 miles, nearly all graded, and arrangements now being made, so far without much evidence of success, to resume work.
Mississippi & Little Rock.—Graded west of Ross, 8 miles, 34 miles of track to lay to finish road to Little Rock; on eastern section, graded, bridges built and ties laid east of Aurich to White River, 5 miles; no work now in progress.
Springfield, Yellville & White River.—Junction of Buffalo and White Rivers, through Yellville to Georges Creek, Marion County, 40 miles; grading begun in May.

*Missouri.*

Greenfield & Northern.—Mt. Vernon south to Aurora, 10 miles surveyed, work not yet begun.
Kansas City, Nevada & Ft. Smith.—Hume south to Pittsburgh, Kan., 55 miles, being surveyed, contract likely to be let soon for perhaps 40 or 50 miles located in 1891.
Missouri, Kansas & Texas on Missouri, Kansas & Eastern.—Boonville along Missouri River to St. Charles, 156 miles, under contract, work making good progress.
St. Louis, Cape Girardeau & Ft. Smith.—Puxico southeast to Poplar Bluff, 20 miles, surveyed, work not yet begun.
St. Louis, Kennett & Southern, on Remiscot R. R.—Kennett east to Caruthersville, 24 miles, company work.

*Texas.*

Chicago, Rock Island & Pacific.—End of track laid in 1892 at Duncan, south to Bowie, 69 miles; located and under construction to Red River.
Georgetown & Granger.—Georgetown to Granger, 15 miles, located in 1891, work may be resumed this year.
Hearne & Brazos Valley.—End of track laid in 1892 at Astin to Stone City, 5 miles.
La Porte, Houston & Northern.—La Porte north to Houston 20 miles, under construction, contract let in May.
Missouri, Kansas & Texas.—Boggy Tank east to Houston, 25 miles located and right of way secured, work to be begun very soon; also, Coupland west to Austin, 25 miles; located and will be built if right of way is secured and bonus voted.
Pan American.—Victoria, south to San Antonia River, 20 miles, some track laid and nearly all graded.
Texas, Louisiana & Eastern.—End of track built in 1891, east of Conroe to Trinity River, 40 miles; some work completed in 1891, and recently resumed.
Velasco Terminal.—Branch from Velasco to Surf Side, 4 miles.

*Colorado.*

Elk Mountain.—Near Glenwood to mines near Robinson Lake, 31 miles, under construction, contract let in March.
Greeley, St. Vrain & Denver.—Greeley to Idaho Creek, 29 miles, located, some work may be done in 1892.

*New Mexico.*

Atchison, Topeka & Santa Fe on Cerrillos Coal R. R.—Waldo, south of Santa Fe, south to Cerrillos mines, 6 miles, under construction.

*Arizona.*

Santa Fe, Prescott & Phœnix.—Ash Fork south to Prescott, 60 miles under contract, location being made south of 25th mile. Work is soon to begin south of Prescott on line to Phœnix, 80 miles.

*Utah.*

Great Salt Lake & Hot Springs.—Bountiful north to Farmington, 10 miles. Company work.
Saltair.—Salt Lake City southwest to Saltair, 15 miles, nearly completed.

PACIFIC COAST STATES.

*California.*

California & Nevada.—Bryant northeast to Walnut Creek, 10 miles; graded in 1891.
San Francisco & North Pacific.—End of track beyond Greenville, west across the Russian River, 3 miles.
Southern Pacific.—Bakersfield south about 50 miles, being graded; line along coast from Santa Margarita to Ellwood, 110 miles; bids have been asked. Work is heavy; line will not be completed for two or three years.

*Oregon.*

Astoria & Portland.—South of Hillsboro, 85 miles toward Portland; under contract.
Siuslaw & Eastern.—Eugene to Florence, 50 miles; location begun this month.

*Washington.*

Everett & Monte Cristo.—Arlington to Monte Christo, 48 miles, partly graded.
Great Northern.—Spokane to Summit of Cascade Mountains, 56 miles under contract; and between the Summit of the Cascades and Puget Sound, 77 miles under construction.
Mason County Central.—Isabella Lake south to junction with Northern Pacific, 8 miles, surveyed.
Northern Pacific.—End of track west of Chehalis west to South Bend, about 28 miles.

CANADA.

*Quebec*

Lower Laurentian.—Extension from Grandes Piles south to Three Rivers, 34 miles, surveyed; propose to begin work this year.
Orford Mountain.—Extension, Lawrenceville to Kingsbury, 10 miles, under contract.
Ottawa & Gatineau Valley.—30th mile north of Hull, near Wakefield, north to 50th m. p., 20 miles; company work.
Quebec, Montmorency & Charlevoix.—St. Anne east to Cape Tourmente, 10 miles; projected.

*Ontario.*

Grand Trunk.—Glencoe north to Kingcourt, 22 miles, contract let in June.
Kingston, Napanee & W.—Tweed north to Madoc, 10 miles, surveyed
Lake Erie & Detroit River.—Leamington east to Merlin, 23 miles, contract let; Merlin east to Ridgetown, 23 miles, surveyed.
Parry Sound Colonization—Bear Lake west to Eaginstown, 10 miles, nearly graded; Eaginstown to Parry Sound, 20 miles, under contract.
Port Arthur, Duluth & Western.—Extension from Sandy Lake southeast to Gunflint Lake, 22 miles, under contract, work to begin in a few weeks.

*Manitoba.*

Canadian Pacific.—Near Deloraine to Napinka, 18 miles; Nesbitt southwest to Souris, 18 miles; Mentieth west about 30 miles; extension of Calgary & Edmonton south of Mosquito Creek to Fort McLeod, about 110 miles.
Manitoba & Northwestern.—Yorktown toward Prince Albert, total length 209 miles, a long projected line; a start on the grading may be made this year.

MEXICO.

Jalisco Pacific.—Recently organized to extend the roads operated by the Mexican National Construction Co.; Colima northeast to Guadalajara, 158 miles; locating survey made.
Mexican, Cuernavaca & Pacific.—Some grading done near city of Mexico; locating survey being made between Contreros and Cuernavaca.
Mexican International.—End of track, south of Torreon, near Tapona, south to Durango, 46 miles, nearly all graded; Monclovia west toward Sierra Mojada, 156 miles, locating survey made for 40 miles, grading begun near Monclovia.
Mexican Northwestern Pacific.—Mexican boundary line south of Deming, N. M., to Corvilatos, 90 miles, and Chihuahua to Guerero, 100 miles, under contract.
Mexican Southern.—End of track south of Tecomava to Oaxaca, 45 miles, track to be laid by September.

## Railroadmen's Eyesight.

Dr. B. Joy Jeffries, of Boston, has favored us with a copy of a pamphlet recently issued by the British Medical Association (office, 49 Strand, London), containing a report of the Council of the Association on "The Efficient Control of Railway Servants' Eyesight." The pamphlet, which costs one shilling a copy, contains a general summary of what has been done by surgeons and others (chiefly surgeons) during the past forty years in the study of color blindness and other defects of vision as affecting the qualifications of railroadmen and seamen, and of the present state of these matters on the railroads of Europe and America.

A historical introduction shows that the first person to draw attention to this subject was the late Dr. George Wilson, of Edinburgh, who wrote on color blindness in 1853. Professor Holmgren, of Upsala, Sweden, whose name has been the most prominent one before the world in this connection, published his first work in 1877, describing his method of testing for colors with skeins of wool which, says the report, had been previously employed by Wilson. The Council has gathered information not only from the roads of the United Kingdom, but from Holland, Italy, France, Sweden, Germany, Austria, Denmark, Switzerland and the United States. The information from this country was given by Dr. Jeffries, and the law of Alabama on the subject, passed in 1887, is given by him as the only satisfactory law in existence. Ohio and Massachusetts have passed laws, but they have been "so worded by the influence of the railroad ring as to be perfectly inoperative." The British Board of Trade has taken some action, but chiefly in respect to color blindness among seamen; and, so far as we have observed from this pamphlet, there is no strict law in the world except that of Alabama.

The investigations of the committee seem to show that the English roads are not much more enlightened than those of this country. Forty-four roads were inquired of, of which 25 replied. The London, Brighton & South Coast and the London & Northwestern are the only prominent companies which employ medical officers to test the eyes of all applicants for employment. Other important companies treat the matter rather carelessly, and some are less particular with locomotive runners than with certain other classes of employés. The railroads do not appreciate the importance of testing each eye separately, and tests for distant vision are so loose that a man rejected by one road may be accepted by another. This test is made by the "government dot test," which is far from sufficient. Cases are found where men who passed the test resigned voluntarily, confessing that their sight was unequal to the requirements of engine driving. A large number of the roads simply require the men to name colored objects. The council makes much of the fact that certain of the examiners have been found color blind themselves. This is of interest in view of the practice of the Pennsylvania road, under the supervision of a distinguished surgeon, in which, by the use of numbers on the different skeins of worsted used in the tests, a totally color blind person can successfully make examinations. Finally, the arrangements for re-examination at stated periods are very imperfect, and some companies employ no tests at all. The committee regards the regulations in Holland, Sweden, France, Italy and Alabama as the best. In Holland and Italy only ophthalmic surgeons are intrusted with the duty of examining.

The recommendations of the committee are substantially the same as those which Dr. Jeffries has so persistently made in this country; all men who handle signals should be examined, and the examiners should be qualified medical men. The permissible degree of inefficiency for enginemen and for other classes is specified. The committee apparently disapproves of locomotive runners or signal men wearing glasses. Re-examination after disease or accident to the eyes, and after negligent conduct is recommended, but no specific period or interval is named.

The regulations of the various countries on the Continent are given in an appendix. In Sweden a person already in the service who has only to *give* signals is not disqualified by moderately poor color sense, the flags to be used by him having the letters R (for red) and G (for green) woven into them, and the glass of the lanterns having one of these letters engraved in it.

The regulations of the English roads are shown in large tables pasted into the back of the book; but, as intimated above, the practice is mostly empirical, and American railroads have little or nothing to learn from it.

In connection with this subject should be mentioned an interesting article on "Color Vision and Color Blindness," by R. Brudenell Carter, which may be found in the annual report of the Smithsonian Institution for 1890, lately issued. The article is a reprint from *Nature*, of May 15, 1890, and is a substance of a lecture delivered at the Royal Institution. It contains a minute and scientific description of the structure of the eye, which, though full of technical terms, makes very interesting reading.

## TECHNICAL.

### Manufacturing and Business.

The Ashton valve Co., Boston, announces that it has purchased the entire plant and business of the Boston Steam Gauge Co. and becomes, by this purchase, the sole manufacturers of the Boston patent steam gauge and of other steam pressures, and vacuum gauges, hydraulic gauges, etc., and also secures a series of valuable patents.

Mr. F. A. Stinard, formerly Division Master Mechanic of the New York, Lake Erie & Western, has become connected with Arthur Pennell, of Kansas City, manufacturer of feed-water purifiers, and will represent him in the East, with headquarters at Paterson, N. J.

The Fishkill Landing Machine Co., of Fishkill, N. Y., reports orders for Fishkill-Corliss engines from the Canada Manufacturing Co., of Carteret, N. J., of 250 H. P.; Citizens' Electric Railway, Fishkill, N. Y., 150 H. P.; Rome Manufacturing Co., Rome, N. Y., 100 H. P. and a number of other orders for engines of 200, 250, 300 and smaller horse power.

A new company, called the Springfield Emery Wheel Co., has been formed with new capital, to succeed to the business of the Springfield Emery Wheel Mfg. Co., of Bridgeport, Conn., which has been in insolvency since May 16. George W. Jackman, General Manager, and other officers of the old firm, will have similar positions with the new firm. New emery wheel machinery will be added to the old machinery which has all been purchased and also all patterns. The company has the records of the former firm for the last eight years and can supply parts of machinery or duplicate orders upon short notice.

The E. W. Bliss Co., Ltd., of 6 Adams street, Brooklyn, recently purchased the plant of the Stiles & Parker Co., of Middletown, Conn., and that company's business has been consolidated with its own. The foundry and machine shops of the Stiles & Parker Co. are offered for sale or to rent.

The Grand Trunk will erect works at Palmerston, Ont., for creosoting ties and timber.

A charter for the Jackson Bridge & Iron Co. was filed in Michigan last week. The capital stock is $100,000. The works of the company are to be at Jackson, Mich.

Mr. S. D. Brewer, of 50 Broadway, New York, who controls the Hussey Re-Heater has issued a circular announcing that he has no connection with the "Hussey Re-Heater and Steam Improvement Co." Mr. Brewer's connection with the Hussey devices for heating exhaust steam dates from 1884, but he has had nothing to do with the company named since 1890, and he says that all statements to the contrary are false and are an unwarranted use of his name.

### New Stations and Shops.

The Northern Pacific will build a freight house 180 × 25 ft. at West Superior, Wis.

There is said to be some prospect of work beginning in August on a new union station for the Denver & Rio Grande and the Union Pacific at Trinidad, Col. The plans and specifications have been ready for some time.

The contract for the erection of the new station for the Lehigh Valley, at Geneva, N. Y., has been awarded to Hugh J. Baldwin, of Waverly, N. Y., for $32,000. It will be 100 × 200 ft. long.

### Iron and Steel.

Carnegie Bros. & Co., Ltd., have decided to erect a large foundry in connection with the Edgar Thomson Steel Works, at Braddock, Pa.

The new universal mill which has been erected by the Pennsylvania Steel Co. for the Central Iron Works, Harrisburg, is now completed as far as the structure is concerned.

M. R. Hunt terminated his four years' engagement as

manager of the Ashland Iron & Steel Co., at Ashland, Wis., on July 1.

At the recent annual meeting of the Anniston Rolling Mills, Anniston, Ala., Robert Frayer was elected President, and W. E. Robertson Secretary and Treasurer.

### A Steam Engine Under Louis VII.

Under the above head the *Moniteur Industriel* reprints from an unknown exchange an item to this effect: A short time ago, in making excavations for the foundations of a new building at Helsingfors, in Finland, the laborers unearthed a large iron-bound chest, which it took several hours' work to open. In it were found a large number of pieces of iron of various sizes and shapes, methodically arranged, and a voluminous parchment roll, giving, in Latin, an extensive treatise on steam, its uses, etc. The iron contents of the chest were found to be nothing less than the several disjointed parts—pistons, cylinders, etc.—of a rude form of steam engine. Nearly all the parts bore the inscription, "Suger parens Galliæ fecit." Suger, who was the prime minister of Louis VII., received from him the title "Father of the country," and it is he, without doubt, to whom the Latin inscription refers. Mr. Nicolas Rizeff, chief magistrate of Helsingfors, to whom the chest and its contents were turned over, proposes, so it is said, to send it to the Chicago Exposition.

It may not be uninteresting to recall, in connection with this matter, the fact that Louis VII. lived from 1137 to 1180, while Denis Papin lived fully four centuries later—from 1647 to 1710—so that apparently there was an application of the expansive force of steam long before the hitherto usually accepted date. The truth of the whole story, however, as outlined above, remains to be established.

### The Chignecto Ship Railroad.

Work on the Chignecto ship railroad is likely to be resumed at once. The chief contractors, Meiggs & Co., owing to financial difficulties, are to be succeeded by Easton & Anderson, who have hitherto been contractors for machinery. Easton & Anderson's manager is expected to arrive from England at Ottawa this week with the firm's resident engineer, and Dawson, Symmes & Usher, who have been contractors for the roadbed, are now at Amherst, N. S. It his hoped that Easton & Anderson may be able to make a new contract with this firm, the old one having been settled up, and that the work will go on at once. The Chignecto railroad bill, permitting the issue of preference bonds, seems to have solved any financial difficulty in the way. The water will be all pumped out of the docks in a few days more, and all will be ready to resume operations, as was announced in our issue of June 17.

### Electric Lighting in the Batignolles Tunnel.

The *Revue Industrielle* gives a few particulars of the electric lighting of the Batignolles tunnel of the Western Railroad Company (France) in addition to those we recently published. At a height of 4.8 metres above the rail level there is strung, on each side of the three tunnels, a series of incandescent lamps, 300 lamps in all for each arch. Each lamp is fixed in a sheet metal box fitted with a parabolic reflector. The tunnel walls, for a certain width, are lined with bright tin plates from which a soft and diffused light is reflected back into the cars. These reflecting plates are covered with glass to prevent tarnishing. The lamps are kept in circuit only while a train is passing. After that, the temporary bright illumination gives way to one of less brilliancy, furnished by a series of 20 incandescent lamps strung along the line of each tunnel arch. The light from these 20 lamps is sufficient for the needs of the tunnel trackmen.

### Warm Air for Steam Making.

The influence on the evaporative power of a boiler of warm air supplied for combustion has recently been again tested in Germany, and the results are given in the *Chemiker Zeitung*. Two sets of tests were made, one with cold air taken from a courtyard through wooden ducts and supplied to the furnace, and the other with air which had been warmed in suitable heating chambers. The number of pounds of water evaporated per pound of coal were found to be,

| | |
|---|---|
| With warm air | 7.77 and 8.70 |
| With cold air | 7.33 and 8.09 |

showing, for the warm air, a gain in evaporative power of from 6 to 7½ per cent. The temperature of the warmed air ranged from about 120 to 128 deg. Fahr., and that of the cold air from about 68 to 75 deg.

### The Dalles Boat Railroad.

The Conference Committee of the Senate and House on the River and Harbor bill have agreed to omit the item of the Dalles Boat Railroad, with a proviso that a new board be appointed to make further study of the project. Probably Mr. O'Rourke can take some of the credit for having stopped a very unscientific and unmechanical piece of business. His communication on the subject to the Chairman of the House Committee, which was published in our issue of June 24, was a demonstration of the fallacies of the plan which could not have been ignored by Congressmen who cared anything about their responsibilities.

### The Canadian Sault Canal.

In the House of Commons at Ottawa on the vote for the Sault Ste. Marie Canal, Mr. Haggart, Minister of Railways and Canals, gave some particulars about the work. The estimated cost of the whole work, lock and approaches, is $4,000,000. The length of the lock will be 900 ft. and the width 60 ft.; and the depth 21 ft. medium low water and 20 ft. extreme low water. The approaches will be the original depth of 16 ft.; to deepen them to 20 ft. would cost another million dollars. The total amounts of the contracts will be $2,262,000 and $737,000 was estimated for engineering and contingencies. If the approaches to the lock were deepened to 20 ft., the harbors of Port Arthur and Owen sound would have to be likewise deepened; for the former the cost would be $300,000 and for the latter $200,000. There have been two changes in the plan of the lock. At first it was intended to make it 100 ft. wide and 600 ft. long; now it is to be 60 ft. wide and 900 ft. long. The original cost of the lock was to be $2,509,807; the increase of depth to 20 ft. increased the cost by $292,000; the change of size to 900 × 60 ft. wide added another increase of $330,000, making the total now $1,768,767.

### A New Sleeping Car.

The Jones Vestibule Sleeping Car Company of Denver, Col., is preparing to have several sleepers built under the Jones patents. These patents cover some novel features. One of them is that the upper berth when not in use can be raised much higher than in the Pullman and Wagner cars, giving greater air space and making the car pleasanter in appearance. Another is, that space is provided between each two sections to allow the occupant of the upper berth to get in by the end and thus avoid disturbing anyone in the lower berth. The backs of the seats are reversible, adjustable steps are provided to bring the steps nearer to station platforms and there is a new arrangement of vestibule. The company includes several railroad men and capitalists of Denver.

### New York Rapid Transit.

Mr. John Bogart has been appointed Chief Engineer of the Rapid Transit Commission of New York. The office has been vacant since Mr. W. E. Worthen was appointed Consulting Engineer, and Mr. W. B. Parsons, Assistant Engineer has had charge of the work. A favorable decision from the General Term of the Supreme Court is expected, and the work of preparing the detailed plans and specifications will in that case be pushed.

### The Wuerpel Switch and Signal Company.

This new concern, lately organized at St. Louis, has its office at 32 Laclede Building, in that city. The General Manager of the company is Mr. Frank A. Lapham and it will manufacture a patent steam derrick, as well as switch and signal apparatus. The company proposes to make interlocking apparatus on the plan in use at East St. Louis, which embodies a combination of pneumatic and hydraulic power. The new concern has already ordered some machinery from the Niles Tool Works.

### Janney Passenger Couplers.

The Allegheny Valley is replacing the Miller coupler on its passenger coaches with the Janney. It has close passenger connections with the Western New York & Pennsylvania, and as that line used the Miller coupler the Allegheny Valley was forced to continue the use of the Miller on its passenger equipment. Recently, however, the Western New York & Pennsylvania management agreed to equip a sufficient number of their coaches with the Janneys to accommodate the Allegheny Valley.

### Lining the Wickes Tunnel.

About 800 of the 6,212 ft. of the Wickes tunnel on the Montana Central has already been lined with granite by Messrs. Henry Downs & Son, of Minneapolis. They have sub-let the balance of the work to D. P. Wortman of Helena, who is now working about 80 men in two shifts. During the winter considerable trouble was experienced from caving in of the ceiling, and it was decided to lower the track and walls one foot, in order that trouble from this source might be lessened. The work is necessarily slow, as there is a delay of an hour every time a train passes through the tunnel, and it is estimated that it will not be completed earlier than the summer of 1894. The granite is obtained from quarries at Boulder, about six miles from the tunnel on the Butte division of the Montana Central. E. R. McNeil, First Assistant Engineer of the company, is in charge of the work.

## THE SCRAP HEAP.

### Notes.

The Allegheny Valley is fitting up its passenger cars with Janney couplers, in the place of the Miller, heretofore used.

Five conductors and ten brakemen have been discharged from the Cheyenne division of the Union Pacific for violation of regulations.

The Empire State express, on the New York Central, on July 4 traversed the distance between Syracuse and Buffalo, 128 miles, in 123 minutes, including stops.

Engineers and firemen of the Duluth, South Shore & Atlantic have secured an increase of pay, ranging from 15 cents to 25 cents a day. The number of hours in a day's work has been reduced from 12 to 11.

It seems, from an item in a Philadelphia paper, that employés of the Lehigh Valley have enjoyed quarterly passes, evidently for their use when off duty, but these have now been discontinued, and the men will have to pay half fare.

The Philadelphia & Reading Coal and Iron Co. has given orders that all collieries in the Schuylkill region shall hereafter work full time. This order, and the two per cent. advance in wages, has caused a better feeling in the coal regions.

Buffet smoking cars are now run on the limited trains of the Chicago & Northwestern between Chicago and Minneapolis. These cars are for the use of the sleeping car passengers, and are both handsome and complete in their appointments.

The Supreme Court of Ohio has declared the Massie law constitutional. This law requires the Secretary of State to retain as fees for the State one-tenth of one per cent. of the capital stock of corporations for issuing certificates of incorporation or consolidation.

A heavy rain at Goshen, Ind., on July 4 washed away a bridge on a branch of the Lake Shore & Michigan Southern. A dispatch from Helena, Mont., July 2, reports several bad washouts on the Montana Central. The high water in the lower Mississippi valley continues and the Illinois Central suffered from flooded tracks July 2. The New Orleans & Southern road is still in bad shape. Near Ottawa, Ill., the Rock Island and the Burlington roads suffered from washouts on July 2.

The train men on the Rio Grande Southern road have had their wages increased, the principal rates, according to a Denver paper, being as follows: Passenger conductors receive $125 a month, and brakemen $90 a month for regular trips; extra runs to be allowed pro rata. Freight conductors receive $125 a month and brakemen $90. For every hour worked in the 24, over 10 hours 40 cents an hour for conductors and 30 cents for brakemen. Regular work train conductors receive $125 a month and brakemen $90, 12 hours constituting a day's work. Freight engineers are paid $165 per month, 10 hours or less to constitute a day's work, and all overtime after 30 minutes' delay to be paid at the rate of 50 cents an hour. Overtime to be computed 10 hours after an engineer is called to leave. One trip over each district to constitute a day. Work train engineers are paid $4 a day of ten hours. Passenger engineers are paid $150 a month. Four men will be placed on the two regular runs. Switch engineers at Ridgway are paid $100 a month; twelve hours to constitute a day's work, all over time after thirty minutes to be paid for at the rate of 35 cents per hour. Firemen promoted to engineers to be paid three-quarters of first-class engineer's pay for their first six months of service, and seven-eights of first-class engineer's pay for their second six months of service, and after one year full pay. Time on switching engines will be counted as one-half the time actual time served. Firemen receive 60 per cent. of first-class engineer's pay on their respective runs. Hostlers receive $100 a month, twelve hours to constitute a day's work.

### Spanish-American Notes.

The Lima Railways Co., Peru, has declared a dividend from the net earnings of 1891, of two per cent.

The railroad from Lota to the coal mines at Buen Retiro, Chili, is nearly finished, and will be open shortly.

The main line of the Cordoba & Northwestern Railway, Argentine, having been inspected and approved by the government officials, has been opened to traffic. The length of this line is 153 kilometres.

The Peruvian Government has approved the contract recently arranged between the municipality of Lima and Don F. Marca for the construction of a horse railroad from Lima to the neighboring town of Miraflores.

At an extraordinary meeting of the shareholders of the Leopoldina Railroad, Brazil, which road suffered so severely from its unfortunate connection with the Companhia Geral fiasco, it was decided to reorganize the company.

Work on the Cartagena-Magdalena Railroad, Colombia, is making rapid progress. Ten miles have already been graded and one and a half miles of track have been laid. The company has received at Cartagena 2,300 tons of rails, besides other material for building the line.

The contract for the completion of the railroad which is to connect the city of Medellin, Colombia, with the town of Puerto Berrio, on the Rio Magdalena, a distance of 150 miles, has been let to the firm of Punchard, McTaggart, Lowther & Co., and a corps of engineers has been sent to begin operations.

The receipts of the eight principal Argentine railroads for the third week in May amounted to $202,800 in round numbers, on a mileage of 3,973, as compared with $225,000, on a mileage of 3,258, for the corresponding period of 1891, the increase of earnings being 25 per cent., and of mileage being 21.6 per cent.

The abuse of state management of railroads in Chili has led to suggestions to sell or lease them to private parties. The working expenses at present consume 90 per cent. of the receipts, which is charged to incompetent management. The gross income for the month of January last amounted to $832,940, which was slightly increased in February. The total cost of the government roads up to date is estimated at $60,000,000.

The Paulista Railroad Company, Brazil, has declared a dividend of 18 per cent. from the operations of 1891. During the year 1891 there were added to the rolling stock of the road 5 locomotives, 10 passenger cars, 1 palace car, 1 inspector's car, 4 mail cars, 4 baggage cars, and 207 freight cars. There were also ordered 10 locomotives, 28 passenger, mail and baggage cars, and 300 freight cars, which are to be delivered during the current year.

The hopes of a speedy completion of the Trans-Andine Railway between Argentine and Chili, are somewhat rudely dashed by the petition sent a few weeks ago by the company to the Argentine Railroad Board asking, first, that the works for the present be carried only as far as Punta de las Vacas, allowing 15 months to get there; second, that a further delay be accorded to reach Puente del Inca, and also a further delay for the rest of the line until the Chilian tunnels be finished; and, third, that four years more be allowed for finishing the tunnel section.

The arrangement between the Amazon Steam Navigation Co. and the Empresa de Obras Publicas no Brazil, whereby the latter syndicate was to acquire the Amazon Co.'s fleet and charter, has fallen through, and the sum of £155,454 which the Empressa had paid on account is forfeited to the Amazon Co. The contract was an unfortunate, not to say unbusinesslike, arrangement on the part of the Empresa, and can only be accounted for on the basis of exaggerated notions as to the prospective prosperity of Brazil, which were too prevalent during the temporary financial boom in that country. The Empresa de Obras Publicas has received absolutely nothing in compensation, having never had control of the Amazon Co.'s fleet, nor having enjoyed a penny of revenue from its operation. The Amazon Steam Navigation Co. proposes to employ this immense forfeit in adding new steamers to its fleet and in the payment of an extraordinary dividend of 10s. a share. Four new steamers were added in 1891.

**Railroads in India.**

The length of railroad in India was 16,890 miles in 1891, and the length under construction was 1,684 miles. The figures returned in March this year are 17,375 miles open and 2,160 under construction. During the past Indian fiscal year, therefore, 485 miles have been opened, and an additional 960 miles have been added to the works actually in progress. The average addition to the railroad network of India since the beginning in October, 1850, has been about 420 miles per annum. This seems small for thickly populated India in comparison with the construction in the United States.

**Flowers on the Michigan Central.**

A number of months ago we mentioned the fact that the custom had been established of distributing flowers to the ladies who were passengers on certain trains of the Michigan Central Railroad, and at that time gave a facsimile of the card which accompanied each little nosegay. It was then, and we believe still is, the custom to use wild flowers largely for this purpose, but this spring the company built two greenhouses at Niles, and has begun another one at Ypsilanti in order to keep up the practice through the winter months. The flowers are accompanied with a card, having a map of the Michigan Central and its chief eastern connections and the inscription "Compliments of the Chief Engineer Michigan Central." Something of the same kind is now done, we believe, by a few other railroads, and we have no doubt that the practice is a valuable advertisement, as it is certainly a very graceful one.

**Railroad Men's Working Hours in England.**

The Select Committee on the Hours of Labor of Railway Servants, first appointed at the commencement of the session of 1891 and reappointed in February last, held their final meeting last week, when the report of the chairman, Sir M. Hicks-Beach, President of the Board of Trade, was adopted and ordered to be presented to the House. The committee find that excessive hours are most frequent on lines with a heavy goods or mineral traffic; and so far as regards the "running staff" on goods, mineral and cattle trains, to a much greater extent than on passenger trains. The committee do not overlook the allegations of the companies that some of the cases of excessive hours complained of were mistaken or overstated and that others were due to accidents, but, after making every allowance, they hold that there are still too many cases in which excessive hours are habitually worked without adequate reason, and that no sufficient effort has been made by the companies generally to deal earnestly and thoroughly with the matter. In regard to signalmen and shunters, whose hours are much easier of regulation within fixed limits than those of the running staff, the committee are of opinion that more should be done in the way of classification according to stress of work, and that more attention should be given to the necessity for Sunday rest. Generally speaking, however, the class of railway servants who have most cause to complain of long hours are the drivers, firemen, and guards of goods, mineral and cattle trains.

Upon the question whether any action by the Government or the Legislature is required to enforce the adoption of any reform, a "legal day" is held to be impracticable, and the committee state that they can approve of nothing which would relieve the companies from responsibility by imposing upon the Board of Trade the duty of making regulations for the working of the traffic by the officers and servants of the companies. It is recommended that the companies should be required, as at present, to make periodical returns of overtime to the Board of Trade; that the attention of any company making an exceptionally bad return should be called to the matter with a view to the hours of work being shortened by the company; and that the correspondence should be published by the Board of Trade. The committee further recommend that on receiving the report of an accident which seems to demand further inquiry, the Board of Trade should require the company to state the hours of work of every servant concerned in the matter. The report concludes with a reference to the cases of Robert Collingwood and William Ellis, who, it was alleged, had suffered some injury in consequence of evidence given before the committee; but it is pointed out that the former did not himself take the initiative in lodging a complaint, and that the latter only did so when he saw the reports which appeared in the press of Collingwood's examination in March, and that both witnesses appeared to feel much more injured by the attacks upon them in the *Railway Review* [London] than by the other proceedings. The committee express the opinion that the articles in the *Railway Review* were most reprehensible; but in view of the refusal of the executive of the Amalgamated Society to accede to the request of the branches for the expulsion of members who had given evidence, of the practical cessation of articles of the kind referred to since the date of that decision, and of Mr. Harford's disclaimer of any intention to infringe the privileges of Parliament, or knowledge that he had done so, they have not thought it necessary to pursue the matter further.—*London Times, June* 10.

**The Smart Yankee.**

"They have wonderfully fast workmen over in the States," said the returned English traveler. "I was talking one day, I remember, to two fellahs, when one of them jumped up, and said he must go, as he had only five minutes left to make a car."

**Elevated Railroad Damage Suits in New York.**

An article in the New York *Tribune*, summarizing the Manhattan Railway Company's litigation during the past year, states that the company has settled a good many of the great multitude of suits for damage to abutting real estate, which have been long pending against it, and that the prospects of closing up all the suits now unsettled have been decidedly improved of late. The proposition that general as well as special benefits are to be offset against the damages inflicted by the railroads has been established as a part of the law governing this class of cases and claims for damages on a considerable portion of the routes, namely, in the whole of Eighth avenue and in Columbus avenue above Seventieth street, have, except in special cases, been practically wiped out. The cases settled by the road are those in the lower parts of the city, where, in consequence of decisions of the Court of Appeals, the liability of the company is beyond question. This applies to nearly all the claims for property in the Bowery, Allen, Division, Pearl and Greenwich streets and a large part of West Broadway and Church street. The main litigation then centred itself on the broad avenues. There were certain portions of Second, Third and Ninth avenues, below Seventieth street, particularly under stations, as well as in Fifty-third street and Sixth avenue, near Central Park, where the injury to property was so marked that the companies were wise enough not to follow any other line of defense than was observed in the trial of cases down town. The same was true of property in old parts of Harlem. But above Fifty-ninth street, west of Central Park, the construction of the road has undeniably improved the value of adjoining property and practically all the cases above Seventy-second street have been decided favorably to the road, or have been abandoned. The company has now completed a third track, between the other two, all the way from 155th street down to Fifty-ninth street, about 4¼ miles, and this is used for express trains. The legality of this additional track is not entirely free from doubt, but as there are practically no objectors except the abutting real estate owners, and as these have been benefited by the construction of the road, the railroad lawyers think they are now in a very safe position.

**A Chicago Draw Bridge Wrecked.**

The steamer "Tioga," light, in tow of the tug "Gardner," ran into the Halsted street bridge, Chicago, on June 30, and knocked it into the river. One of the bridgetenders was on the bridge and went down with it, but was not injured. One end of the bridge landed on the tug and broke off the upper works, doing about $800 damage. The other end fell into the river. The bridge cracked in the centre when it fell, and is a total wreck. Navigation was completely blocked several days. The bridge was built in 1871, and cost $15,000.

**Hours of Labor in France and Switzerland.**

The British Parliamentary report on hours of labor on railroads, and recently referred to in these columns, has the following paragraph on Continental practice:

"It appears that in Russia the Government issues certain general regulations, the interpretation of which is practically left to the discretion of the railway companies, but that no other country, except France and Switzerland, has in any way attempted to deal with the hours on railways which are not the property of the state. In France, by a law of 1846, the Minister of Public Works has power to compel the railway companies to adopt such regulations under penalty of fine or imprisonment, as he thinks proper, for the police, safety and working of railways. In exercise of this power a circular was issued by M. Yves Guyot, Minister of Public Works, in April, 1891, directing that the hours of drivers and firemen should never exceed 12 out of 24, except in cases of extreme urgency, inclusive of the time of attendance before the departure and after the arrival of trains; and the length of uninterrupted rest should be fixed at 10 hours at the least. This circular appears to have been entirely disregarded, as, in October, 1891, the Labor Committee of the Chamber of Deputies reported that the companies continue to impose unduly long hours on enginemen and guards, who are often on duty for 16 or 18 hours, and are much overtaxed. Last year a bill was considered by this committee on account of its forming part of the larger question of the hours of adult workers, on which they are conducting a wider inquiry; and the bill, as reported, only provided for a more thorough supervision of the working of the railways on a system which would practically impose the responsibiliiy for it on the government. The discussion of this measure was postponed, pending the examination of a new bill proposing to fix definite limits for the hours of work; but this has, in its turn, been shelved; and, although the Chamber of Deputies almost unanimously accepted its principle, there seems no probability of early legislation on the subject. In Switzerland an act was passed in 1890 providing that the normal period of effective work of all persons working for regular hours in the service of the railways, steamboats and of transport undertakings holding concessions from, or worked by, the Confederation, should not exceed 12 hours, save for exceptional purposes: that the "running staff" should have an uninterrupted rest of at least ten hours and other servants nine hours, those living in stations or houses on the line eight hours; at least an hour to be allowed in the middle of the day. There are to be 52 holidays in the year, of which 17 are to be on Sundays, without deduction of pay; and no goods traffic except *grande vitesse* is allowed on Sundays. The law is to be enforced by a penalty of 500 francs, increasing to 1,000 francs for repeated offenses. It is now being gradually put into force; and, from a dispatch recently received, it would seem that fair progress has been made in carrying it out. The principal difficulties have arisen from the provisions in the Act requiring 17 free Sundays in the year to be allowed to every railway servant, and an hour of rest in the middle of the day; and in very many cases the Federal authorities have found it necessary to sanction a considerable departure from the terms of the Act in these and other points, generally securing in return some compensating advantages for the servants. But it is obvious that neither in length, nor in volume of traffic, can the Swiss railways (to which, it should be observed, subventions are granted by the Government) be at all compared with those of the United Kingdom.

**Humor From Chicago.**

If Ransom R. Cable, President of the Rock Island road, should be captured by brigands while traveling through Italy, would the brigands hold him for ransom and cable to his family, even if they ransom risk in using the cable for that purpose?

**Why Wasn't It Brass-bound?**

The regular weekly meeting of the Memphis Passenger Association was held yesterday, but only routine business was transacted. An incident of the meeting was the presentation to Chairman S. L. Finlay of a handsome Bible with gold clasps and ornamentations. The gift was doubtless prompted by the provisions of the new revised agreement which gives the chairman power to examine under oath any of the members against whom charges are preferred for violation of the agreement.—*Memphis Appeal-Avalanche.*

**One Passenger to a Carload.**

An interesting miniature railroad train is on exhibition at Elitch's Gardens, Denver, Colo., consisting of a locomotive and 10 cars—1 platform, 1 coal, 1 stock, 1 box and several passenger cars, sleepers, caboose, etc. The train runs on about 500 ft. of track, the gauge of which is 12 in. The cars are about 3 ft. long, and the engineer rides on the foremost one. The engine when in working order weighs 231 lbs. It can pull four cars at a moderate speed. The train was built by the man who runs it, he having been a workman in the Union Pacific shops at Denver, and all the details are closely copied after Union Pacific standards. The owner expects to take the train to the World's Fair next year.

**All the Traffic Will Bear.**

The rule by which the Southern Pacific fixes its freight rates is one that but few people understand. A full demonstration of it is seen every day in the week by the local producers. Not long ago a shipper wanted to send four carloads of potatoes from a point in the Sacramento Valley to Phœnix, Ariz. He went to the general office and asked for a rate. He was told that the young man who had the rate sheet in charge was not there, and as he had mislaid it, it could not be found. So the shipper would have to call the next day. He called next day and was given the rate. He was told it would be 40 cents a 100 lbs. How did the Southern Pacific arrive at this rate? not by consulting the rate sheet—of course not. This mislaid tariff was a transparent trick. The agent had telegraphed to the point from which the potatoes were to be shipped and had asked for the price of potatoes there in carload lots, which he was given. He then telegraphed to Phœnix for the price at which potatoes were selling there. The former price was 50 cents a 100 lbs. and the latter $1. The 40 cent rate added to the first price made the potatoes cost the shipper 90 cents laid down in Phœnix, and he thus made 10 cents.—*A San Francisco Romancer.*

**Race Traffic in Paris.**

On the Sundays of the great races near Paris the suburban railroads manage to carry a good many passengers. The day of the last "Grand Prix" the line on the right bank of the Seine carried 244,000 passengers and that of the left bank 32,900. The increase over 1891 was 52,400 passenger journeys.

**A New German Railroad.**

It is expected that a new strategical railroad from Carlsruhe into Lorraine will be begun in the course of the next few days. The cost of the undertaking will be shared between the empire and the Grand Duchy of Baden. The Reichstag has already sanctioned the imperial contribution, and the Baden Chamber has approved of the agreement between the empire and the Grand Duchy and voted the first installment. The expenditure on the new railroad amounts in the case of Baden alone to more than 10,000,000 marks, and the necessary alterations in the existing lines will take a further sum of about 8,500,000 marks. The empire will contribute three-quarters of the sum necessary for construction and 22 per cent. of the expenditure on alterations. The cost of the new bridge over the Rhine, estimated at over 4,000,000 marks, will be borne equally by the empire and the Grand Duchy. The railroad, which is to have two tracks, will be finished by April, 1895, and will be used for ordinary traffic in times of peace.

## LOCOMOTIVE BUILDING.

The Brooks Locomotive Works have an order from the Buffalo, Rochester & Pittsburgh for nine engines for delivery in September.

## CAR BUILDING.

There are now being built for the Duluth, Messabe & Northern 316 cars, and for the Duluth & Winnipeg 266 cars, all of which will be equipped with Fox pressed steel centre plates and National hollow brake beams.

The New York, Chicago & St. Louis is having 1,000 freight cars built of 60,000 lbs. capacity. They have M. C. B. couplers and Westinghouse automatic brakes, with metal brake beams, and McGuire grain doors. They are being built by the Peninsular Car Co. and the Michigan Car Co. Some of them have already been delivered, the balance to follow in August and September.

The works of the Duluth Co. are very busy, employing at the present time about 500 men. The company is working on the following orders: 100 iron box cars for the Chicago, Hamilton & Dayton; Duluth, Messabe & Northern, 200 ore cars, 50 platform cars, 10 box cars, 50 logging cars and 6 cabooses; Duluth & Winnipeg, 200 ore cars, 50 platform cars, 10 box cars and 6 cabooses; Cranberry Lumber Co., 50 logging cars; Mitchell & McClure, 60 logging cars, and Merritt & Ring, 22 logging cars. It also has contracts for cast and wrought iron work for several combination bridges, and is selling a large number of wheels.

## BRIDGE BUILDING.

**Cambridge, Mass.**—Sealed proposals will be received by the Cambridge Water Board, Cambridge, until July 12, for the construction of a wrought iron and steel plate girder highway bridge over the location and tracks of the Watertown Branch of the Fitchburg Railroad at Huron street, the bridge to be 93 ft. in length and 58 ft. in width between the railings. Plans and specifications can be seen at the office of the City Engineer, City Hall, Cambridge.

**Chester County, Pa.**—Work has been commenced on a fine iron and stone bridge to span the Lancaster highway at the Phœnixville Branch road, near Glen Loch. It will be 60 ft. long and 25 ft. high.

**Columbus, O.**—Proposals wanted until July 21, for a bridge across Big Walnut Creek, in Hamilton township. Address Henry J. Carew, County Auditor, Columbus.

**Dolgeville, N. Y.**—The Highway Commissioners of the town of Manheim and Oppenheim have condemned the old covered bridge that crosses the East Canada Creek at State street. Bids for the construction of a new iron bridge, truss pattern, 128 ft. span, 38 ft. wide, with 6-ft. walks on each side, will be opened on July 20, at the office of Edward A. Brown, Herkimer. The covered bridge is one of the oldest in Herkimer county.

**Duluth, Minn.**—The Commercial Improvement Co., capital $1,000,000, has filed articles of incorporation. Under the charter the incorporators may build bridges

and railroads and the project at present is to build a bridge, connecting Duluth, from Rice's Point, and West Superior by way of Connor's Point. A bill has already been introduced in the lower house of Congress authorizing the construction, at this point, of a pivot draw bridge not less than 155 ft. in the clear on either side of the draw. The bill requires work to be begun within two years, and completed within three.

Work has been commenced on the foundations for the Lake Avenue viaduct. The Shifflex Bridge Co., of Pittsburgh, was awarded the contract in March for $45,600.

**Herkimer, N. Y.**—A special election will be held this week to vote on the question of appropriating $9,500 to build a bridge over the West Canada Creek, about a mile north of this village. A proposition was submitted to the voters several weeks ago to raise $10,000 for this purpose, and was defeated.

**Jamestown, N. Y.**—The City Engineer has been authorized to prepare plans and specifications of the new bridges on Hunt Road and Camp Street, and the Bridge Committee will advertise for bids for this and other bridge work.

**Knoxville, Tenn.**—The Knoxville, Cumberland Gap & Louisville will build an iron bridge across a ravine in Lonesome valley to replace a wooden trestle lately wrecked.

**Manayunk, Pa.**—The Pencoyd Bridge Co. has been awarded the contract to raise the inter-county iron bridge that spans the Schulykill River at Manayunk. The bridge is to be elevated from 3 to 4 ft. from the centre to the east end, so as to allow freight trains to pass beneath it.

**Pueblo, Cal.**—The city council has awarded the contract for a new Fourth street bridge to the Bullen Bridge Co.

**Quinton, N. J.**—Proposals are wanted until July 13 for constructing the iron highway bridge over Alloway Creek, at Quinton, by Board of Chosen Freeholders, at Salem, N. J.

**Saginaw, Mich.**—The contract for building the Mackinaw street bridge over the Saginaw River, in this city, has been awarded to the Detroit Bridge & Iron Works.

**Tweed, Ont.**—It is understood that the County Council has decided to erect a new iron bridge at Tweed, to take the place of the present wooden structure across the Moira River, at that town.

**Wilkesbarre, Pa.**—The Pennsylvania Railroad is making the preliminary arrangements for the construction of an iron bridge across the Susquehanna River at Wilkesbarre, to connect with the Wilkesbarre & Western road.

**Winona, Minn.**—The steel cantilever wagon bridge across the Mississippi has been completed and was opened to the public on July 4 with elaborate exercises. The total length, including approaches, is 1,755 ft., and the bridge proper consists of four spans, from 200 to 360 ft. in length. The structure was built by the Chicago Bridge & Iron Co., and the total cost was about $100,000.

**Yankton, S. D.**—A franchise has been granted by Congress for constructing a bridge across the Missouri River at this city.

## RAILROAD LAW—NOTES OF DECISIONS.

### Powers, Liabilities and Regulation of Railroads.

In Kentucky it is held by the Supreme Court that a special act requiring a particular railroad to keep a watchman at a certain turnpike crossing does not constitute partial legislation, nor unjustly discriminate against the company in question.[1]

In the Supreme Court of the United States it is laid down that a writ of *mandamus* to compel a railroad corporation to do a particular act in constructing its road or buildings or in running its trains can be issued only when there is a specific legal duty on its part to do that act, and clear proof of a breach of that duty.[2]

In Texas it is ruled that a statute providing that where a claim not exceeding $50, for stock killed by a railroad, shall be presented, etc., and not paid within 30 days, the claimant may recover, in addition to the claim, the fee of an attorney, if one is employed, not exceeding $10, does not violate a constitutional provision prohibiting special laws providing for or changing the method of collecting debts, or in all cases where a general law could be made applicable.[3]

In Ohio it is decreed by the Supreme Court that the exactions imposed by the State statute of 1889 requiring every corporation operating a railroad or any part of a railroad within the State to pay to the Commissioners of Railroads and Telegraphs a "fee" of one dollar per mile for each mile of track operated by it within the State, since the sum exacted is arbitrary, and is to be applied solely to swelling the general revenues of the State, and has no apparent connection with any benefits conferred upon railroad companies by the act creating the office and prescribing the duties of the Commissioner of Railroads and Telegraphs, cannot be regarded as an assessment levied according to such benefits, but must be regarded as a tax, and, as the property of railroads is by the general revenue laws taxed at its true value in money, the act is in violation of art. 12, sec. 2 of the constitution, requiring that laws shall be passed "taxing by a uniform rule . . . all real and personal property according to its true value in money;" and of section 5, declaring that "no tax shall be levied except in pursuance of law, and every law imposing a tax shall state distinctly the object of the same, to which only it shall be applied."[4]

In Texas the Supreme Court holds that the statute which requires intersecting railroads to maintain a depot or depots at the point of intersection unless they shall have a "union depot" in an adjacent town, was not intended solely for the convenience of the inhabitants of such adjacent town, but chiefly for the convenience of travelers, who, on arriving at the point of intersection on one road, might desire to continue their journey on the other; and hence the maintenance of separate depots by two intersecting roads in a town about half a mile distant from the point of intersection is not a substantial compliance with the act.[5]

The Court of Appeals of New York decree that where a railroad charter provides that upon failure to commence or complete the road as therein provided the company "is to forfeit the rights acquired by it under this act," a cause of forfeiture does not *per se* divest the company of the franchise without suit brought for that purpose, and the company cannot be attacked for its default in condemnation proceedings instituted by it.[6]

In Arkansas the Supreme Court holds that the question as to the justice of the regulation of passenger rates must be determined by its effect on the net earnings of the entire line operated by defendant company, and not by its effect on the net earnings of any given subdivision of the whole line, even though such subdivision was formerly a separate road, owned by a different corporation, which was consolidated with defendant.[7]

The Supreme Court of the United States holds that the provisions of a statute of South Carolina of 1882, that the entire expenses of the Railroad Commission, which is thereby created and invested with general supervision of all railroads in the state, "shall be borne by the several corporations owning or operating railroads" within the state, is not in conflict with the Fourteenth Amendment to the Constitution of the United States, forbidding deprivation of property without due process of law, and securing to every person equal protection of the laws; as the business of such corporations is affected with a public use, and subject to legislative regulation, and the regulations imposed are within the power of the state to prescribe, and the exercise of the duties of the commissioners is beneficial to the public, and also to the railroad corporations."

### Injuries to Passengers, Employes and Strangers.

In West Virginia the Supreme Court rules that a railroad is liable for the false imprisonment of a passenger made or caused to be made by its conductor, and that this liability is not altered by a statute providing that "the conductor of every train of railroad cars shall have all the powers of a conservator of the peace while in charge of the train."[8]

In Arkansas the Supreme Court rules that the voluntary payment by a passenger of an unlawful overcharge does not preclude him from recovering the statutory penalty. Nor does the fact that he got upon the train for the sole purpose of subjecting the company to the penalty.[10]

The Supreme Court of Texas holds that the statute requiring the company to light and warm its depots applies to all passenger depots, and is not confined to those at the junctions of railroads, and it having neglected during cold weather to heat its depots, a passenger may recover for suffering sustained from contracting a severe cold and a fever while waiting several hours for a delayed train.[11]

The Supreme Court of Alabama rules that although a conductor is not a person intrusted with the duty of seeing that the "ways, works, machinery or plant" of a railroad company are in proper condition, within the State code, which declares a master liable to a servant for any injuries caused by any defect therein, yet a rule requiring railroad employés to exanine the soundness of cars, engines, machinery, etc., before using them is proper.[12]

In New York the defendant and another road jointly used a track in passing trains from the road of one to that of the other. An employé of the latter, while at work upon the track, was injured by the negligence of trainmen in charge of defendant's train. The Supreme Court rules that he and such trainmen were not fellow-servants.[13]

In Tennessee it is held that it is error to charge that, for the protection of employés in its shops, a railroad company is bound to have its machinery "safe so far as human skill and foresight can make it."[14]

In North Carolina the Supreme Court decides that a railroad having cut its roadbed along the side of a mountain, it is negligence for it to leave masses of rock, which had been loosened in blasting, in such a position that they are liable to fall at any time upon the track; and it is not relieved from liability for a consequent injury to an employé on its train by the fact that it hires a track-walker whose duty it is, before and after the passage of each train, to see whether rock has fallen or is about to fall.[15]

In Illinois it is ruled that a statute which requires a bell or whistle to be sounded at the distance of at least 80 rods from a crossing, and to be kept going until the crossing is reached, applies also to trains which start from a point less than 80 rods from the crossing.[16]

In Indiana, the plaintiff, on approaching the crossing of defendants' railroad, at the only point from which he could see an approaching train, until close to the crossing, looked and listened, and, not seeing or hearing any train, proceeded with his team walking, continuing to look and listen, until he was close to the crossing, when a train, without giving any of the signals required by law, or other warning, came rapidly, frightening his horses. Plaintiff, attempting to hold them, was thrown down and injured by the horses and wagon passing over him. The Supreme Court rules that defendant was not exonerated from liability for failing to give signals of the approach of the train by the fact that plaintiff's horses were frightened by the lawful sounding of the whistle as the signal for the crossing of another highway, as well as by the moving train; and because it did not appear that the horses were docile, or that plaintiff could have heard the signals if sounded and would have stopped, and could have controlled his horses at that distance.[17]

It is laid down in the Federal Court that 40 or 45 miles an hour is not an excessive speed at which to approach a railroad crossing in the country, where the train which is running at that speed has a whistle and a bell which can be heard at the distance of a mile.[18]

In a New Hampshire case it appears that a person killed at a crossing by a special train, running near the time of a regular train, was afraid of the crossing, and usually waited at home until trains had passed; she had her watch with her, had a safe horse, and stopped at the foot of the ascent to the track; the view was somewhat obstructed, and the signal was not given as required by the statute; it is held that these facts were sufficient to warrant a finding that she was not negligent.[19]

The Court of Appeals of New York holds that the omission of a railroad company to have the head-light in its engine lighted at about dusk will not warrant a recovery for the death of one run over by the engine at a crossing, where the engine and cars, as well as the reflection of the lights from the car windows, was distinctly visible to persons near the crossing.[20]

[1] Ky. Cent. Ry. Co. v. Commonwealth, 18 S. W. Rep., 368.
[2] North P. R. Co. v. Territory, 12 S. C., Rep., 283.
[3] Gulf, C & S. F. Ry. Co. v. Ellis, 18 S. W. Rep., 723.
[4] P., C. & St. L. Ry. Co. v. State, 30 N. E. Rep., 435.
[5] San Antonio & A. P. Ry. Co. v. State, 14 S. W. Rep., 1063.
[6] In re Brooklyn El. Ry. Co., 20 N. E. Rep., 474.
[7] St. Louis & S. F. Ry. Co. vs. Gill, 15 S. W. Rep., 18.
[8] C., C. & A. R. Co. vs. Gibbons, 12 S. Ct. Rep., 255.
[9] Gillingham v. Ohio River R. Co., 14 S. E. Rep., 243.
[10] St. Louis & S. F. Ry. Co. v. Gill, 15 S. W. Rep., 18.
[11] Tex. & Pac. Ry. Co. v. Mayes, 15 S. W. Rep., 43.
[12] Memphis, etc., R. R. Co. vs. Graham, 16 South. Rep., 283
[13] Noonan v. N. Y. Cent. & H. R. R. Co., 16 N. Y. (Supp.), 678.
[14] E. T., V. & G. Ry. Co. v. Aiken, 14 S. W. Rep., 1062.
[15] Bean v. Waterbury, N. C. R. Co., 12 S. E. Rep., 600.
[16] L. S. & M. S. Ry. Co. v. Johnson, 26 N. E. Rep., 510
[17] Terre Haute & I. R. Co v. Brunker, 26 N. E. Rep., 178.
[18] Griffith vs. B. & O. R. Co., 44 Fed. Rep., 574.
[19] Evans vs. Concord R., 21 Atl. Rep., 105.
[20] Daniels v. Staten Island R. Co., 26 N. E. Rep., 466.

## MEETINGS AND ANNOUNCEMENTS.

### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Canadian Pacific*, semi-annual, 2½ per cent. on the capital stock, payable Aug. 17.

*East Pennsylvania*, semi-annual (guar.), 3 per cent., payable July 19.

*Kewaunee, Green Bay & Western*, semi annual, 1 per cent., on the preferred and common stock, payable July 1.

*Little Schuylkill Navigation Railroad & Coal Co.*, semi annual, 3½ per cent., payable July 5.

*Mine Hill & Schuylkill Haven*, semi-annual, 2 per cent., payable July 15.

*New York Central & Hudson River*, quarterly, 1¼ per cent., payable July 15.

*Paterson & Hudson*, semi-annual, 4 per cent., payable July 1.

*Petersburgh*, annual, 3 per cent., on the common stock, payable July 1.

*Richmond, Fredericksburg & Potomac*, semi annual, 3½ per cent., on the common stock, payable July 1.

*Richmond & Petersburg*, semi-annual, 3½ per cent. on the capital stock, payable July 1.

*Rutland*, semi annual, 2 per cent. on the preferred stock, payable July 1.

*Wilmington & Weldon*, semi-annual, 4 per cent., payable July 15.

### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Cincinnati, Hamilton & Dayton*, special, Cincinnati, O., July 18.

*Hancock & Calumet*, annual, Hancock, Mich., July 12.

*Little Falls & Dolgeville*, annual, Dolgeville, N. Y., July 20.

*Marquette, Houghton & Ontonagon*, annual, Marquette, Mich., July 21.

*Marquette & Western*, annual, Marquette, Mich., July 21.

*Mineral Range*, annual, Hancock, Mich., July 21.

### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Association of General Baggage Agents* will hold its next annual meeting at Mackinac Island, Mich., July 20.

The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y. The next meeting will be Sept. 15.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Engineers and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

**Engineers' Club of Cincinnati.**

The subject for discussion at the June meeting of the club was that of a new water supply for the city of Cincinnati, which was appropriate at this time on account of the election to be held soon to vote on an appropriation for the purpose and the new water works commission to be appointed.

Papers on the subject were prepared by Col. Lathen Anderson, G. Bouscaren, M. D. Burke and John W. Hill, of Cincinnati, and Edward Flad, of St. Louis, in addition to which Messrs. Hosea, Whinery, Baldwin, Harper, Ewing, Mathewson and Punshon took part in the discussion. Several prominent citizens, not members of the club, were present by invitation, and took quite an interest in the proceedings.

**Roadmasters' Association of America:.**

The next meeting of the Roadmasters' Association of America will open at Chattanooga, Tenn., Oct. 18, and will be adjourned to meet for the business sessions at Atlanta, Ga., the following morning. John Doyle is President and J. H. K. Burgwin, of Grand Rapids, Mich., is Secretary.

## PERSONAL.

—Mr. J. W. Schaub has resigned his position as Engineer of the Detroit Bridge & Iron Works, Detroit, Mich.

—Mr. Clarence H. Howard has been elected Secretary of the Safety Car Heating Co., succeeding Mr. Charles Gately, who has resigned.

—Mr. William Pitt Sherman, for many years Treasurer of the New York, Lake Erie & Western, and later Commissioner of Accounts of New York City, has established an office as Consulting and General Auditor, at 18 Broadway, New York.

—Mr. E. I. Cordner, Eastern Passenger Agent of the Richmond & Danville system, with headquarters at New York city, has resigned. Mr. Cordner has held this position about six months and was formerly Passenger Agent of the Pennsylvania at Jacksonville, Fla.

—Mr. C. Peter Clark has been appointed General Freight Agent of the Old Colony Railroad and Old Colony Steamboat Companies. He is a son of President Clark, of the New York, New Haven & Hartford, and has been General Eastern Agent of that company for some time, with headquarters in Boston.

—Mr. Robert English, who has been Master Mechanic of the New Mexico division of the Atchison, Topeka & Santa Fe, has been appointed General Master Mechanic of the Atlantic & Pacific. He succeeds Mr. G. A. Hancock, who has resigned to accept a similar position with the San Antonio & Aransas Pass.

—Mr. Frederick W. Pratt, Chief Engineer of the Wisconsin Central, has resigned. He has accepted a position as Engineer of Construction on the Missouri, Kansas & Texas, with headquarters at St. Louis. Mr. J. W. Kendrick, Chief Engineer of the Northern Pacific and the Chicago & Northern Pacific, will hereafter have charge also of the Wisconsin Central Engineering Department.

—Mr. J. W. Miller, former General Manager of the New York, Providence & Boston, who was elected Second Vice-President of the New York, New Haven & Hartford about four months ago, soon after the lease of the former road, has resigned the latter position, but still retains the presidency of the Providence & Stonington Steamship Co.

—Capt. W. M. Davidson has been promoted from the position of General Passenger Agent of the Savannah, Florida & Western to that of General Passenger Agent of the entire Plant system, which includes the Savannah, Florida & Western, Charleston & Savannah, Brunswick & Western, Alabama, Midland and South Florida roads, and the Plant Steamship line. Capt. Davidson has been General Passenger Agent of the Savannah, Florida & Western since Aug. 1, 1889. He was formerly Florida Traffic Agent of the system.

—Mr. Morris Wuerpel, for some years Superintendent of structure and interlocking for the Terminal Railroad Association, of St. Louis (the Eads bridge and the Union Station) has resigned that position and is now at the head of the Wuerpel Switch & Signal Co., of St. Louis, recently organized. Mr. Wuerpel's old position with the Terminal Railroad Association has been filled, as already announced, by the appointment of Mr. N. W. Eayrs, formerly Resident Engineer of that company, but for the last year General Manager of the Wheeling Bridge & Terminal Company.

—Mr. R. R. Bridgers, Superintendent of the Western North Carolina division of the Richmond & Danville has recently resigned that position. Mr. C. P. Hammond, Superintendent of the Atlanta & Charlotte Air line division, and Mr. W. A. Walden, Master Mechanic of the same division have also resigned. Mr. Hammond has been succeeded as Superintendent by Mr. J. A. Dodson, who was formerly Superintendent of the South Carolina division. Mr. A. W. Gibbs, formerly Superintendent of Motive Power of the Central of Georgia, succeeds Mr. Walden as Master Mechanic at Atlanta.

—Mr. Charles F. Stowell, who has been for eight years Bridge Engineer of the New York State Board of Railroad Commissioners, has associated himself with Mr. M. C. Clay and Mr. A. C. Cunningham in the American Engineering and Inspection Association. Their principal office is 25 North Pearl street, Albany, N. Y. The work of the company will be specialized under the three chiefs, Mr. Stowell having charge of the Department of Structures; Mr. Clay of that of Construction and Erection and Mr. Cunningham of that of Manufacture. Mr. Cunningham has been with the Massillon Bridge Co. and with G. W. G. Ferris & Co., Engineers and Inspectors, and resigned the position of Chief Inspector at the Union Mills of Carnegie, Phipps & Co. to take his present place.

## ELECTIONS AND APPOINTMENTS.

*Alexander & Rich Mountain.*—The incorporators of this new West Virginia company are: W. G. Arden, Henry L. Davis and C. F. Bushnell, of Philadelphia; William E. McElroy and James H. Lockhart, of Pittsburgh, Pa., and John Alexander, of Alexander, W. Va.

*Atlantic & Pacific.*—Richard English has been appointed General Master Mechanic to succeed G. A. Hancock, who has resigned. His headquarters will be at Albuquerque, N. Mex.

*Baltimore & Ohio Connection.*—The following are the incorporators and first board of directors: Robert B. Campbell, Granville A. Richardson, Leonard S. Allen, Alfred P. Bigelow and William J. Kennedy, all of Chicago.

*Binghamton & State Line.*—The following is a list of the present officers of the company: President, Jos. P. Noyes; Vice-President, W. Scott Brandt; Secretary, E. E. Katteli; Treasurer, H. C. Ross, Chief Engineer, Joseph K. Noyes, and Locating Engineer, Charles W. Sherman, all of Binghamton, N. Y.

*Buffalo, Rochester & Pittsburgh.*—C. M. Cook, Engineer of Maintenance of Way, has resigned and the work of his department has been transferred to the office of Chief Engineer W. E. Hoyt.

*Central of Georgia.*—J. C. Haile, of Columbus, Ga., has been appointed General Passenger Agent, with headquarters at Savannah, Ga.

*Central of Pennsylvania.*—The following are the first directors: William H. Ulrich, E. W. Hoffer, Hummelstown, Pa.; John F. Rohrer, Edwin W. Jackson, Jay T. Rohrer, Joseph C. Smith, Harrisburg, Pa.; J. F. Klugh, Highspire, Pa.; George W. Cumbler, A. A. Cumbler, Steelton, Pa.

*Chesapeake & Ohio.*—Charles P. Ryan, formerly Division Passenger Agent, has been appointed General Passenger Agent, to succeed H. W. Fuller. His headquarters will be at Cincinnati instead of Washington.

*Chicago, Burlington & Quincy.*—Joel West has been appointed Master Mechanic of the Iowa lines, with headquarters at West Burlington, Ia.

*Chicago Great Western.*—At a meeting of the directors on June 30 the following officers were elected: S. C. Stickney, Chairman of the Board; John M. Egan, President and General Manager; W. B. Bend, Treasurer; R. C. Wight, Secretary, and M. C. Healion, Auditor.

*Chicago, St. Paul & Kansas City.*—John M. Egan has resigned the position of President and Ansel Oppenheim has been elected to succeed him.

*Chicago & West Michigan.*—A circular just issued by General Manager C. M. Heald announces that owing to the large increase in mileage during the last two years, the Superintendent of Tracks, Bridges and Buildings, will devote his attention exclusively to the maintenance of the roadway, and matters pertaining thereto, and he will be relieved of all matters pertaining to bridges, culverts and buildings. His title, hereafter, will be Superintendent of Track. The Chief Engineer will assume entire charge of all matters connected with the construction, repair and maintenance of bridges, culverts, buildings, docks, and all similar structures. All requisitions for material used in the construction and repair of such structures, shall be made or approved by the Chief Engineer.

*Hannibal & St. Joseph.*—P. H. Houlahan has been appointed Superintendent of the Eastern Division, vice W. E. Cunningham, transferred. Mr. Houlahan has been Superintendent of the Western Division of the Hannibal & St. Joseph, and this appointment reunites the two divisions. Mr. Cunningham will be Superintendent of the Chicago, Burlington & Kansas City, with office at Hannibal, Mo.

*Jacksonville, St. Augustine & Halifax River.*—W. L. Crawford, formerly Superintendent, has been appointed General Superintendent of these lines. The office of General Manager has been abolished. Joseph Richardson has been appointed General Passenger Agent. W. H. Chambers, formerly Cashier, has been appointed Auditor. The office of General Auditor has been abolished.

*Kansas City Elevated.*—The chief incorporators of this new company, whose organization was noted last week, are S. M. Jarvis and S. L. Conklin, of the Jarvis Conklin Mortgage Co., of Kansas City, Mo., and Robert Gillham.

*Louisville & Nashville.*—Edward Rowland, Auditor of Receipts, has resigned to go into business in Louisville. W. F. Dickinson, Assistant Auditor of Receipts, succeeds him.

*Louisville, New Orleans & Texas.*—The office of General Passenger Agent, made vacant by the resignation of P. R. Rogers, has been abolished, and the duties of the position will hereafter be assumed by the Traffic Manager, L. F. Day.

*Lynchburg & Durham.*—At the annual meeting held in Lynchburg, Va., the old Board of Directors were re-elected. W. C. Houston, Jr., was re-elected President, with Peter J. Orey and J. C. Carr, Vice-Presidents.

*Mexican Southern.*—The principal officers resident in Mexico are: W. Morcom, Manager; W. A. Eckersley, Manager Construction, and J. G. Claw, Chief Engineer, all with offices in Puebla, Mex.

*Minneapolis, St. Paul & Sault Ste. Marie.*—W. L. Martin, recently appointed General Freight Agent, still retains the title and duties of Treasurer of the company.

*Norfolk & Western.*—J. R. Ruffin has been appointed Division Freight Agent of the Winston-Salem Division, with office at Winston-Salem, N. C., vice A. P. Warrington, resigned, to engage in other business. W. C. Beck has been appointed Traveling Freight Agent, with headquarters at Roanoke, Va., vice Mr. Ruffin, promoted, both appointments taking effect July 1.

*Pennsylvania.*—H. H. Colby has been appointed Chief Inspector of Bridge and Track Material, vice W. H. Hipple.

*Pittsburgh, Chartiers & Youghiogheny.*—The station heretofore known as Chartiers or West Chartiers has been changed to McKee's Rocks, Pa. This is also the postoffice address of this station, at which the superintendent's office is located.

*Richmond & Danville.*—The office of the Superitendent of Motive Power having been transferred from Atlanta, Ga., to Washington, D. C., all correspondence intended for R. D. Wade, Superintendent Motive Power, should be addressed to Washington.

A. W. Gibbs, late Superintendent of Motive Power and Machinery of the Central of Georgia, has been appointed Master Mechanic of the Atlanta & Charlotte Air Line division of this company, with headquarters at Atlanta, Ga., to succeed W. A. Walden.

John A. Dodson has been appointed Superintendent of the Atlanta & Charlotte division with office at Atlanta, vice C. P. Hammond, resigned.

*San Antonio & Aransas Pass.*—George A. Hancock has been appointed Superintendent of Machinery of the road, with headquarters in San Antonio, Tex.

*Savannah, Florida & Western.*—George W. Coates formerly agent of the Brunswick & Western, at Brunswick, has been appointed Acting Division Freight and Passenger Agent, vice J. A. McDuffie, resigned.

A circular announces that Col. C. D. Owens' jurisdiction as Traffic Manager is extended to the South Florida road and Plant Steamship line.

*Seattle & Montana.*—A. L. Horner has been appointed Superintendent of the Seattle & Montana, Fairhaven & Southern and New Westminster & Southern roads, with headquarters at Seattle, Wash., to succeed S. S. Neff, resigned. Mr. Horner was formerly Division Superintendent of the Northern Pacific.

*Texas Central.*—F. B. Aglar, General Agent of the Union Pacific at New Orleans, has resigned to accept the position of General Freight and Passenger Agent of the Texas Central, with headquarters at Waco, Tex.

*Texas & Pacific.*—The office of A. T. Canfield, Purchasing Agent, has been abolished. A. J. Derussy is appointed General Western Agent, with headquarters at Denver, vice J. H. Lawder, assigned to other duties. D. W. Morris has been appointed Live Stock Agent at Fort Worth; the office of General Live Stock Agent, heretofore maintained at Fort Worth, has been abolished.

*Union Pacific.*—The office of Assistant Treasurer of the company in New York City will be abolished in October.

*Washington & Idaho.*—The annual meeting was held at Spokane, Wash., last week. The following were elected directors: F. L. Ames, S. H. H. Clark, Julius Galland, Theodore Galland, Jay Gould, Edwin T. Atkins, H. M. Herman, G. W. Truax and Albert H. Otis.

*Wisconsin Central.*—J. W. Kendrick, Chief Engineer of the Northern Pacific, will hereafter be Chief Engineer of this road also. E. J. Pearson has been appointed Principal Assistant Engineer of the road. The engineering office heretofore maintained in Milwaukee has been abolished.

## RAILROAD CONSTRUCTION.

### Incorporations, Surveys, Etc.

**Adirondack & St. Lawrence.**—The heavy and continuous rains have so retarded the ballasting on the Northern division that it has become necessary to postpone the opening of the road from Malone to Tupper Lake and Childwold until July 16.

**Ahnapee & Western.**—The tracklaying will begin shortly, and the officers expect to complete this work on the 13 miles from Casco northeast to Ahnapee this month or early in August. Most of the grading between these points was completed last year. E. Decker, of Ahnapee, is Chief Engineer.

**Akron & Eastern.**—Work has been commenced on the construction of this line, which will connect the Pittsburgh, Akron & Western at Akron with the Western New York & Pennsylvania at New Castle, Pa. A large number of laborers is now engaged in grading at the western end of the line.

**Alexander & Rich Mountain.**—A charter for this company was filed in West Virginia last week. It is to build a road, chiefly for lumber purposes probably, near the Buckhannon River through Upshur County south of the Buckhannon branch of the West Virginia & Pittsburgh. The capital stock is $75,000 and the headquarters are at Alexander, Upshur County, W. Va.

**Baltimore & Ohio Connection.**—Articles of incorporation of the company were filed in the office of the Secretary of State, at Springfield, Ill., June 30. It is proposed to construct a road from a point near the town of Beverly Hills, Cook County, northwesterly to a junction with the Chicago Central (Northern Pacific) in Chicago. The capital stock is $200,000.

**Binghamton & State Line.**—Surveys have just been commenced on this line south of Binghamton at the Susquehanna River to the Pennsylvania state line, about 10 miles, the surveys being made by Charles W. Sherman, of Binghamton, Locating Engineer.

**Buffalo & Geneva.**—The construction work on this line has been so delayed by rainy weather that the double track road will hardly be opened for passenger traffic before August. When the traffic contract between the Lehigh Valley and the New York, Lake Erie & Western expired on May 1, it was renewed two months on the expectation by this company's officers that the new road would be ready for operation on July 1; but unfavorable weather has so delayed the contractors that it has been necessary to postpone the opening of the line another month. The track between Buffalo and Geneva, 96 miles, was completed last year, but the line will not be opened until most of the double track work is finished. So far about 50 miles of the double track has been completed.

The work on the Geneva & Van Ettenville has also been delayed, but the track has now been laid with the exception of about 11 miles of the middle section of the road, and the grading on this gap will be completed in a few weeks. The tracklaying has been completed for 29 miles south of Geneva and for 20 miles north of Van Ettenville, but as reported last week only 41 miles of this track has been built since Jan. 1; that is, from Swartwood about five miles north of Van Ettenville, to Burdette 20 miles, and from Lodi north to Geneva 21 miles.

**Burlington & Missouri River.**—Kilpatrick Bros. & Collins, who have the contract for the extension beyond Gillette, Wyo., to a point 10 miles beyond Sheridan, have now 1,300 teams employed and about 3,500 men. Tracklaying is being pushed at the rate of a mile a day. As the weather becomes thoroughly settled the present force will probably be doubled. The work will be pushed without intermission. The work is very heavy, but not so difficult as on the sections nearer Gillett, now completed.

**Calgary & Edmonton.**—The grading on this road has been completed to within five miles of the new town site of MacLeod, Alberta. Tracklaying will be commenced immediately, south of Mosquito Creek. The contractors state that trains will be running by Aug. 1, the entire distance from Edmonton to Fort MacLeod.

**Cambridge, Minneapolis & Duluth.**—A party of 12 engineers is now in the field making a preliminary survey from Cambridge, Minn., to the St. Paul & Duluth. H. F. Baker is President.

**Central of Pennsylvania.**—The company was chartered in Pennsylvania last week, with a capital stock of $100,000. The road will extend from a junction with the Middletown & Hummelstown road, in Middletown, to a point in Steelton, about six miles. William H. Ulrich, of Hummelstown, Pa., is President.

**Chicago, Burlington & Quincy.**—The work is progressing on the new line to connect with the Alton bridge now being built, but as yet no track has been laid. The new road is 32 miles long, as already reported, and it is being built as a branch of the St. Louis, Keokuk & Northwestern. It begins at Old Monroe, on that line, and extends east through St. Charles and St. Louis counties to St. Louis, crossing the Missouri River nearly south of Alton, Ill. E. M. Gilchrist, Resident Engineer, has charge of all construction work through St. Charles County. B. L. Crossby, Resident Engineer, has charge of the bridge to be constructed over the Missouri River and the construction of the line in St. Louis County and city. W. S. McDonald, Resident Engineer, has charge of the construction of the Alton Bridge. It is being built under another name, but the Rock Island & St. Louis Division of the Chicago, Burlington & Quincy will cross it when completed, forming a junction with the extension of the St. Louis, Keokuk & Northwestern in St. Charles County, and then crossing the bridge over the Missouri into St. Louis proper over the St. Louis, Keokuk & Northwestern.

**Chicago Central.**—This branch of the Chicago & Northern Pacific system has been completed this year from a junction with the main line at Ogden avenue in Chicago south to Blue Island, and southeast to Harvey. The track laid on the branch this year is reported by General Manager Ainslie to be 7.77 miles of double track and 1.44 miles of single track, so that 16.86 miles of single track have been constructed in the year, but only 9.21 miles of road. The double track line is north of Seventy-fifth street. An extension is now being built from East Chicago east to Pine Station on Lake Michigan.

**Chicago, St. Paul, Minneapolis & Omaha.**—The proposed change of location of the tracks at Mankato, Minn., to bring the road nearer to the business part of the city will, after all, not be made this year. At a recent meeting of the City Council permits to build the track through certain streets were granted. The losses sustained by reason of rains, however, have decided the officers not to do anything this year, but the change will probably be made next year.

**Chickamauga & Durham.**—It has been reported in several of the railroad papers that this road has been completed since January for the entire distance from Chickamauga to Durham, Ga., 17 miles. It is an error, however, to assume that all the track between these points has already been laid. A report from the Chief Engineer states that only the grading has been completed between these points, and that at present about eight miles of track has been laid. It is expected to complete the work early in August.

**Clarksville Mineral.**—The force at work on the grading on the middle section has been largely increased recently, and trains will be running through to the Nashville, Chattanooga & St. Louis.

**Coal River.**—The route of this road, incorporated in West Virginia last week, is said to be from St. Albans up Coal River in a southwest direction for, say 30 miles, to connect with the Norfolk & Western. The capital stock is $1,000,000. The names of the incorporators were given last week.

**Colorado Midland.**—General Manager Collbran and other officers of the company made an examination last week of the proposed Cripple Creek extension and of the mines, and if their report is favorable the construction of the branch will be commenced at once. The line will be about 18 miles long, beginning at Hayden Divide and extending north to Cripple Creek. A tunnel 3,000 ft. long will be necessary at one point on the line. It is expected that it will cost about $500,000 to complete and equip the branch.

**Duluth, Messabe & Northern.**—Tracklaying was begun on July 4, and will follow the graders as fast as possible. A large force of men and teams is now employed.

**Duluth, South Shore & Atlantic.**—Henry & Balch, of Minneapolis, have been awarded the contract for building the new line from Iron River Junction to West Superior, Wis., 30 miles. The work has already commenced and is to be completed by Oct. 1.

**Findlay Belt.**—The company has built 4.2 miles of main track since January 1, but the new track is not to any stations or termini; this line being built mainly to facilitate business with all the roads entering Findlay, O. The new road now has connections made with all the older lines. In addition to main track about one mile of side track has been built. Louis Zeperwick is Engineer in Charge. The office is at No. 103 South Main Street, Findlay.

**Florence, Cripple Creek & State Line.**—Right of way at Florence and Fremont, Col., was obtained last week, and also a route across the Arkansas River. This secures for the company full right of way from Florence to the business part of Cripple Creek. It is stated that grading will be commenced at once, and the road built rapidly, but this is by no means sure.

**Great Northern.**—The first through freight train on the Pacific Coast extension arrived in Spokane, Wash., on Wednesday of last week.

Although work west of Spokane is being delayed by reason of the failure to settle matters pertaining to right of way through the city, supplies for the work continue to arrive, generally about 40 car loads of ties, rails and construction material daily. It is said that nearly 1,000 car loads of material have already arrived. The ballasting is going on along the entire division east of Kalispell, Mont., to within 25 miles of Spokane.

**Green Bay, Winona and St. Paul.**—It is reported that a line will be built from a point near Merillan, Wis., on the main line, to St. Paul and Minneapolis.

**Hancock & Calumet.**—The reconnoissance begun in May for a new connecting track to connect this road and the Mineral Range has just been completed, but the officers have not yet decided when to begin the construction of the line. The new road will be about eight miles long, extending from Lake Linden to Calumet, forming a new connection between the Hancock & Calumet and the Mineral Range roads near their southern termini. These roads are controlled by the same interest and have the same officers, but are operated to some extent independent of each other.

**Harriman Coal and Iron.**—The end of track on this belt line is now at Robertson's Branch of the Emory River on the north side of Harriman, Tenn. From that point, is less than two miles of easy work to the Brushy Mountain Division junction at DeArmond's Station on the East Tennessee, Virginia & Georgia. The total track laid in 1892 exclusive of side track from rolling mill or brickyards to Robertson's Branch is 316 miles. The work beyond Roberrson's Branch is delayed by some trouble in adjusting right of way matters. The Brushy Mountain Branch is 15 miles long, of which over 12 miles have been graded.

**Huntingdon & Broad Top.**—Spencer M. Janney, President of the road, together with a party of officials, made an inspection trip last week, visiting the new shops at Saxton and going over a new branch road up Sandy Run which is just completed. This road opens new bituminous coal fields in the Broad Top region.

**Illinois, Indiana & Michigan.**—John McLean, of Muskegon, Mich., is reported to have been awarded the contract for the grading on the eastern portion of this road, which was incorporated a few weeks ago to build a line from New Buffalo through Michigan City to connect with the roads reaching Chicago from the East. It is stated that the connection with Chicago railroads will be made at Kensington, on the Illinois Central, and that the new line will be in operation by next June. It is understood to be an extension of the Chicago & West Michigan road, the northern terminus of that road being at New Buffalo, on Lake Michigan.

**Intercolonial.**—In the Canadian Parliament last week the Minister of Railways stated that the yearly deficit up to May 1, 1891, was $516,984, and to June 1, 1891, $575,976; May 1, 1892, $529,748; June 1, 1892, $545,643.

**International & Great Northern.**—No new line has been built this year by this company, but about 45 miles of 56-lb. rails have been taken up and replaced by 70-lb. rails. About 41 miles of old iron rails were taken out of the track and the 56 lb. rails laid in their place.

**Kanawaha & Michigan.**—The following is a list of the subcontractors on the Malden extension from Malden to the Ganley River, 32 miles: J. S. Casement, of Charleston, W. Va., being the general contractor: Edward Cowley, Brownston, W. Va.; Moran & Kelly, Lewiston, W. Va.; Peter Blaser, Coalburgh, W. Va.; R. F. Rivinac & Co., Cedar Grove, W. Va.; W. R. Johnson & Co., Dego, W. Va.; Patrick Dougher, Cannelton, W. Va.; Shump & Glenn, Cannelton, W. Va.; Boxley, Waley & Co., Kanawha Falls, W. Va., and A. S. Withrow Lumber Co., Brownstown, W. Va.

**Kansas City, El Dorado & Southern.**—A charter for this company was granted on June 28 in Missouri by the Secretary of State. The route of the road is from Rich Hill in Bates County southeast a distance of about 30 miles to El Dorado, in Cedar County. The capital stock is $450,000. The company is apparently a re-organization of a road organized in 1890 and which did a little grading at El Dorado in that year.

**Lake Shore & Michigan.**—The report printed last week that work was in progress on a line between Hillsdale, Mich., and Elkhart, Ind., was an inadvertence, as the main line now passes through both of those towns. The company is not contemplating any new construction work.

**Louisville Belt.**—The project of building a belt road at Louisville has been revived, with a good promise of realization, by a syndicate including, it is said, George L. Danforth, T. C. H. Vance, and J. C. Fawcett, of Louisville.

**Louisville Southern.**—A survey has been made for a road from Frankfort southwest to Waddy, on the Louisville Southern. The distance is 18 miles and the road, if built, will no doubt be in the interest of this company.

**Lower Laurentian.**—No new track has been laid since Jan. 1 on this road, but the company expects to complete some work before the end of the year on the extension toward Three Rivers, Que. Surveys have been made for 22 miles from the present terminus at Grandes Piles down the west side of the St. Maurice River toward Three Rivers. But as the Canadian Pacific is operating a branch between these points, there does not seem to be any very pressing need for the construction of the new road.

**Mexican Southern.**—The tracklaying south of Tecomavaca, Mex., has been completed this year to a point 75 kilometres south of that town, as reported last week. The grading has been finished for the entire 90 miles to Oaxaca, and the track will reach that point in September. About the beginning of next year it is very probable that work on extension beyond Oaxaca City will commence. There will be from 80 to 100 miles and possibly much more. At present it is difficult to give definite information as to this.

**Mexico, Cuernavaca & Pacific.**—Major J. L. Butman, Chief Engineer, has recently begun the final location on the mountain division of the road, from Contreras to Cuernavaca, Mex.

**Milwaukee, Lake Shore & Western.**—A short branch track is now being built from Sandhurst to Choate, Mich. The grading is being done by Davidson & Co., and the track will soon be laid. This is the only branch which the company is now engaged in constructing.

**Minneapolis, St. Paul & Sault Ste. Marie**—Additional contracts for construction, making 119 miles under contract, have been let to Linden & Co., Nicolet Bank Building, Minneapolis. Of this the extension from Valley City, N. D., to the crossing of the Cheyenne River in T. 150 R., 67, will be 107 miles in length. The other extension is 12 miles in length, from Merricourt, N. D., west.

**Missouri, Kansas & Texas.**—The preliminary survey for the Austin extension has now been completed for more than half the distance between Coupland and Austin. The new line is between 20 and 25 miles long, penetrating a rich cotton district, and is north of the Houston & Texas Central line.

**Montpelier & Chicago.**—Tracklaying began at Montpelier, O., July 1, and will be continued west at the rate, it is expected, of two miles a day. The grading has been completed for much of the distance to Hammond, Ind.

**Natchitoches.**—Bids for clearing four miles of the branch north to the Red River were to have been let this week. Bids will be received for grading and tracklaying and for cross ties by President L. Caspair, at Natchitoches, La.

**New Roads.**—A survey has been made, it is reported, for a line about 23 miles long from Cuthbert north to Richland, Ga. The line would connect the Central of Georgia with the Savannah, Americus & Montgomery at stations about 15 miles east of the Chattahochee River. Nothing definite has been done toward organizing a company to build the road.

A surveying party started from Chambersburg, Pa., this week to survey a route from the Cumberland Valley road at Newville, Pa., to the Broad Top coal regions. Portions of a similar route were surveyed last year.

C. A. Edgar, J. B. Warren, and others, of Nevada, Mo., are endeavoring to secure enough local subscriptions to build a light railroad between Nevada and Eldorado Springs, Mo.

**Norfolk, Wilmington & Charleston.**—The town of New Berne, N. C., and the townships of Craven County have, it is reported, voted to subscribe $150,000 to the capital stock of the company; $75,000 of the subsidy to be payable when the road is completed between New Berne and Washington.

**Northern Pacific.**—The Ocosta branch of the Tacoma, Olympia & Gray's Harbor line was opened for traffic last week. It begins at Aberdeen and extends west to Ocosta, Wash., on the south side of Gray's Harbor, near the Pacific Coast. Ocosta is about 66 miles west of Centralia on the Pacific Division.

**North Galveston, Houston & Kansas City.**—This company has been chartered by M. C. McLemore, Walter Gresham, A. R. Campbell and others to construct a road from a point in Galveston to Virginia Point, a distance of 16 miles. The capital stock is $160,000.

**Owensboro, Falls of Rough & Green River**—It is again reported that contracts are to be let very soon for the proposed branch south of the main line to Horse Branch, Ky., connecting with the Newport News & Mississippi Valley. The line is about 10 miles long and the surveys were made in April.

**Paducah, Tennessee & Alabama.**—The contracts for the extension south of Hollow Rock, Tenn., have been let to Sullivan, Johnson & McGlaughlin for the grading, and to M. S. Cartter & Co., of St. Louis, for the bridge work. The line has just been located, and is 30 miles long from Hollow Rock, the present terminus of the road south to Lexington, Tenn., where connection is made with the Tennessee Midland, the junction being at a station about 20 miles west of the Tennessee River, to which the line is now in operation.

**Perry County.**—The tracklaying of the line on the extension from New Bloomfield, Pa., is still being continued, the company at present employing a force of about 50 men on this work. The track has reached a point about seven miles southwest of New Broomfield. The grading has been completed to Landisburg and Loysville, about five miles beyond the present end of track.

**Plymouth & Middleboro.**—The tracklaying was completed to Middleboro, Mass., on July 1. The road is about 15 miles long, extending across Plymouth County from Plymouth west through North Carver to Middleboro, connecting at both points with branches of the Old Colony. The construction work was begun last January by McCarthy Bros., of Franklin, Mass. A train was run over the line on July 1, but it will not be opened for traffic before August, as the ballasting has only just commenced. The road has a grade of about 50 ft. to the mile on the first three miles from Plymouth. There is only one grade crossing on the line, four undergrade iron bridges, five over grade wooden bridges and one pile trestle 180 ft. long. The town of Plymouth voted the company a bonus of $50,000; Middleboro, $20,000, and Carver, $5,000. T. D. Shumway is President.

**Roxborough.**—The grading was begun last week near Philadelphia. The contracts have been let to Kennedy Crossan, of Philadelphia, for the grading in the city limits, and he has begun work on Monastery avenue. John T. Dyer, of Norristown, who has the contract for the grading in Montgomery County, has begun work at Ship Lane. The difficulty in securing certain portions of the right of way, which a few weeks ago seemed likely to compel the abandoment of the work, has now been overcome, and the right of way has been secured all the way from Chelten Avenue station, Germantown, on the Chestnut Hill branch of the Pennsylvania, to Corsons, Montgomery County, where a junction is made with the Trenton Cut-off. The length of the line is 10 miles. Its construction will not be easy, as it passes through a hilly and broken country along the Wissahickon River, and 11 large bridges will be required. Three of these across Wissahickon Creek will be particularly expensive. There will be no grade crossings within the city limits, and few, if any, in Montgomery County. The road will pass through Roxborough, Manatawna, Barren Hill and Plymouth.

**Santa Fe, Prescott & Phœnix.**—Tracklaying south of Ash Fork, Ariz., will begin next week. The grading has been completed for about 27 miles, and ties have been distributed over most of the distance. It is hoped to complete the work to Prescott in September.

**Sinslaw & Eastern.**—The engineers began the locating survey west of Eugene, Or., last week, and a portion of the road near that point has already been cross-sectioned. The grading will probably be commenced this week. The line will be about 50 miles long, the western terminus being at Florence on the Pacific Coast.

**Starke & Sampson City.**—The report that the track had been laid this year on five miles between Starke and Sampson City, Fla., was an error. That work has not yet been commenced, and the completion of the road seems to be indefinitely postponed.

**Tennessee & Coosa.**—The town of Huntsville, Ala., has succeeded in securing the right of way for the line to the Tennessee River, 14 miles, and work began July 1.

**Tomhicken, Milnesville & Eastern.**—The Chief Engineer of this road writes that the project has been abandoned. The company was incorporated early in the year to build a road from Tomhicken to Milnesville, Pa., eight miles.

**Union Pacific.**—Tracklaying has commenced on the extension of the Red River branch of the Union Pacific, Denver & Gulf in New Mexico, but so far hardly a mile of road has been built. J. R. DeRemer, of Denver, is building a branch from near Road Junction, Col., to a coal mine, about eight miles.

**Winchester & Beattyville.**—The contract has just been let to Thomson Bros., of Ashland, Ky., for grading this road from its junction with the Kentucky Midland, about two miles above Lumber Point, to Beattyville, on the Kentucky River, a distance of 5¾ miles. A branch to coal mines will increase the mileage to 6¾ miles. The work will be light and the grades easy, but there will be considerable high trestle work. The location has just been completed and construction work is not fairly begun. The principal business of the new road will be coal and timber. Robert Wallace, of Versailles, Ky., is President, and J. H. Pearson, of Beattyville, is Chief Engineer.

**Yankton, Norfolk & Southwestern.**—The contract for grading 65 miles, from Yankton, S. D., to Norfolk, Neb., has been let to William Larson, of Lansing, Mich., and John Naughton, of Sioux Falls, S. D. The contractors are to have the road completed, ready for rolling stock, by Dec. 1.

## GENERAL RAILROAD NEWS.

**Allegheny Valley.**—W. H. Barnes, Receiver of the road, submitted his final report to the United States Circuit Court, at Pittsburgh, July 2, and an order was made discharging him. The accounts were transferred to the new company in February.

**Atchison, Topeka & Santa Fe.**—The gross earnings, operating expenses (exclusive of taxes and rentals) and net earnings of the road and its auxiliary lines for the month of May were as follows:

| | Gross earn. | Oper. exps. | Net earn. | Mileage. |
|---|---|---|---|---|
| Roads owned and controlled | $2,913,694 | $1,788,650 | $1,125,044 | 6,547 |
| Roads jointly owned: Atchison's one-half | 158,883 | 108,500 | 50,382 | 587 |
| Total | $3,072,577 | $1 897,150 | $1,175,426 | 7,127 |
| St. Louis & San Francisco | $542,292 | $327,111 | $215,181 | 1,328 |
| Roads jointly owned: 'Frisco Co.'s one-half | 155,772 | 103,635 | 52,137 | 535 |
| Total, 'Frisco system | $698,034 | $430,746 | $.67,318 | 1,863 |
| Aggregate, both systems | $3,770.611 | $2,327,896 | $1.442,744 | 8,991 |

COMPARATIVE STATEMENT, ALL LINES.

| | Gross earn. | Net earn. | Per mile Gross earn. | Per mile Net earn. | Mileage. |
|---|---|---|---|---|---|
| *Atchison system:* | | | | | |
| May, 1892 | $3,072,570 | $1,175,426 | $431 | $164 | 7.127 |
| May, 1891 | 2,953,183 | 1,066,653 | 415 | 149 | 7,114 |
| Increase | $119,393 | $108,773 | $16 | $15 | 13 |
| *'Frisco system:* | | | | | |
| May, 1892 | $693,064 | $267,318 | $374 | $143 | 1,864 |
| May, 1891 | 665,963 | 218,299 | 357 | 117 | 1,863 |
| Increase | $32,101 | $49,018 | $17 | $26 | 1 |
| *Aggregated general system:* | | | | | |
| May, 1892 | $3,770,611 | $1,442,744 | $419 | $160 | 8,991 |
| May, 1891 | 3,619,145 | 1,284,952 | 403 | 143 | 8,977 |
| Increase | $151,496 | $157,792 | $16 | $17 | 14 |

**Beech Creek.**—The stockholders have authorized the issue of $1,000,000 four per cent. second mortgage bonds, guaranteed by the New York Central & Hudson River road, to cover the 15-mile extension from Kerrmoor to Mahaffey, which is now being built and is to be finished by Sept. 1. The line reaches extensive coal fields as yet undeveloped. The road is through a very rough country and requires several tunnels, all of which have been constructed for a double track. At Mahaffey connection will be made with the Pennsylvania & Northwestern. The stockholders have also voted to issue $1,000,000 new stock with a four per cent. guarantee by the New York Central. The new securities are to be issued from time to time to pay for extensions in Clearfield County, which will have an aggregate mileage of 70 miles and which will reach rich undeveloped coal lands. At present only about $250,000 of bonds and $250,000 of stock will be issued to pay for the Kerrmoor extension. A portion of the bonds will be used to purchase new equipment.

**Boston & Maine.**—A special meeting of the stockholders was held on June 29 at which a new issue of bonds amounting to $2,500,000 was authorized for the purpose of refunding about $1,500,000 of seven per cent. bonds which become due next January; the balance of $1,000,000 is to be used for new equipment and improvements to the roadbed. The stockholders also ratified the purchase of the following leased roads: The South Reading, whose stock is to be exchanged at par with for Boston & Maine stock at the selling price of the latter on the day the consolidation is approved; the Dover & Winnepiseogee, exchange of stock being on the basis of four shares of its stock for three of the Boston & Maine, which, however, owns 2,635 shares of the 4,800 outstanding, and the Wolfborough road whose stockholders will receive a half share of Boston & Maine stock for each share of their present shares.

**Camden & Alexandria.**—The formal transfer of this property to the Missouri Pacific was made on July 1, when the St. Louis, Iron Mountain & Southern began operating the line. The road extends from Camden southeast to El Dorado, Ark., 33 miles, but trains will be run through fram Gurdon 32 miles northwest of Camden.

**Canadian Pacific.**—The company reports the following operations for May and the five months:

| *Month of May.* | 1892. | 1891. | Inc. |
|---|---|---|---|
| Gross earnings | $1,702,624 | $1,602,918 | $99.705 |
| Oper. expenses | 1.101,640 | 1,013,281 | 88.359 |
| Net earn. | $600,984 | $589,638 | $11,346 |
| *Since Jan. 1.* | | | |
| Gross earnings | $8,029,211 | $7,424,982 | $604.229 |
| Oper. expenses | 5,377,878 | 5,072,273 | 305,605 |
| Net earnings | $2,651,333 | $2,352,709 | $298,624 |

**Central of Georgia.**—H. M. Comer has been appointed sole Receiver of the company. The appointment was made by Judge Speer, of the United States District Court, upon application of the Central Railroad & Banking Co., of Georgia, the Farmers' Loan & Trust Co., of New York, trustees of the holders of the tripartite bonds, and other creditors, including Speyer & Co., the New York firm of bankers, on the ground that a sole Receiver could better manage the property under the present conditions.

Default was made in the interest payments due July 1. The indebtedness of the road is chiefly represented by the seven per cent. and six per cent. bonds, there being $4,999,000 of the former and $4,600,000 of the latter.

A meeting was held this week of members of the syndicate that provided the means last autumn with which to pay off the floating debt of the company. C. S. Fairchild, W. Luttgen, of August Belmont & Co., and F. P. Olcott were appointed a committee to act with Speyer & Co. in whatever steps it might be necessary to take in order to secure payment of the loan. The firm is now engaged in considering a plan of reorganization of the company which, however, it would take some time to perfect.

**Chesapeake & Ohio.**—The following statement of earnings is issued:

| *Month of May:* | 1892. | 1891. | Inc. or dec. |
|---|---|---|---|
| Gross earnings | $681,254 | $720 824 | D. $39,570 |
| Oper. expenses | 534,440 | 581,540 | D. 47.100 |
| Net earn | $146,814 | $139.284 | I. $7,530 |
| *Since July 1:* | | | |
| Gross earnings | $8,249,212 | $7,446,296 | I. $802,916 |
| Oper. expenses | 6,165,395 | 5,561,377 | I. 605,018 |
| Net earn | $2,083,817 | $1,885.919 | I. $197,898 |

**Chicago, Burlington & Quincy.**—The statement of earnings and expenses of the system for May, and the five months ending May 31, makes a poor showing for May, but this is largely due to the floods that prevailed during that month in a large portion of the territory traversed by the road. The figures are given below:

| *Month of May:* | 1892. | 1891. | Inc. or dec. |
|---|---|---|---|
| Gross earnings | $2,822,975 | $2,618,707 | I. $204,268 |
| Expenses and charges | 2,830,112 | 2,388,655 | I. 470,457 |
| Net earnings | Def. $36,137 | 230 052 | D. $266,189 |
| *Jan. to May 31:* | | | |
| Gross earnings | $14,910,545 | $12,160,388 | I. $2,750,157 |
| Expenses and charges | 14,302,312 | 12,067,782 | I. 2,234,530 |
| Net earnings | $608 233 | $92,606 | I. $515,627 |

**Chicago, Milwaukee & St. Paul.**—The following is the statement of the earnings and expenses for May and for eleven months ending May 31:

| *Month of May:* | 1892. | 1891 | Inc. |
|---|---|---|---|
| Gross earn | $2,251,618 | $2,097,547 | $154 071 |
| Expenses and taxes | 1,678,128 | 1,545,093 | 133,035 |
| Net earn | $573,490 | $552,454 | $21,036 |
| *Eleven months:* | | | |
| Gross earn | $29,698,730 | $25,356,609 | $4,342,121 |
| Expenses and taxes | 19,031,094 | 16,893,502 | 2,137,592 |
| Net earn | $10,667,636 | $8,463,107 | $2,204,529 |

**Choctaw Coal & Railway Co.**—A committee of creditors consisting of E. P. Wilbur, Effingham B. Morris and Sidney F. Tyler, are engaged in formulating a plan for the rehabilitation of the property. To facilitate this purpose the committee of stockholders appointed in November last to present a plan of reorganization recommend stockholders to deposit their stock without delay.

**Cleveland, Cincinnati, Chicago & St. Louis.**—The statement of earnings for May and the year to May 31 is as follows:

| | 1892. | 1 91. | Inc. or dec. |
|---|---|---|---|
| Gross earn | $1,033,013 | $1,026,722 | I. $6,291 |
| Oper. expen | 792,320 | 711,744 | I. 80,576 |
| Net earn | $240,693 | $314,978 | D. $74,285 |
| Fixed charges | 216,808 | 218,415 | D. 1,607 |
| Surplus | $23,885 | $96,563 | D. $72,678 |
| *Eleven months to May 31.* | | | |
| Gross earn | $12.587,900 | $12,073,688 | I. $514,212 |
| Oper. expen | 8,997,011 | 8,511,026 | I. 485,985 |
| Net earn | $3,590,889 | $3,562,662 | I. $28,227 |
| Fixed charges | 2,349,823 | 2,366,326 | D. 16,503 |
| Surplus | $1,241,066 | $1,196,336 | I. $44,730 |

**Louisville & Nashville.**—The earnings for May and 11 months of the fiscal year were as follows:

| *Month of May:* | 1892. | 1 91. | Inc. |
|---|---|---|---|
| Gross earnings | $1,707,678 | $1,496,504 | $211,174 |
| Operating expenses | 1,147,667 | 1,004,531 | 143,136 |
| Net earn'ngs | $560,011 | $491 973 | $68,038 |
| *For 11 months:* | | | |
| Gross earnings | $19,519,525 | $17,710,263 | $1,809,262 |
| Operating expenses | 12,674,580 | 11,210,355 | 1,464,225 |
| Net earnings | $6,844.945 | $6,493,908 | $345,037 |
| Miles oper | 2,886 | 2,218 | 618 |

**Mobile & Birmingham.**—T. C. Bush, President of the Mobile & Birmingham, has been appointed Receiver of the road by order of the State Chancery Court at Mobile, Ala., on the application of Gen. Samuel Thomas.

**New York & New England.**—President Parsons is reported to have announced that enough of the stock has already been pledged to assure the success of the voting trust and to enable him to go ahead with his plans.

**Ohio Valley.**—The company assumed control of the Clarksville & Princeton branch of the Louisville & Nashville on July 1, in accordance with an agreement made a number of months ago. According to the terms the Louisville & Nashville was to relay the road with new rails. This has been about completed. The extension from Gracey to Hopkinsville, now under construction, will be finished and put in operation by Aug. 1.

**Poughkeepsie Bridge Co.**—The Poughkeepsie Bridge was sold under foreclosure, July 1, at Poughkeepsie, N. Y., the proceeding being amicable. The property was bought in the interest of the reorganization party for $2,500,000, and will be turned over to the Philadelphia & Reading at an early date on the terms already agreed upon between the company and the Bondholders' Reorganization Committee.

**Richmond & Danville.**—The interest due on July 1, on the bonds of the leased roads was paid, but not on the six per cent. bonds of the Richmond & Danville, Receiver Huidekoper said that the discrimination is made because the court regards it as important to keep the system intact, and if we did not pay the leased line obligations there would be movements on the part of bondholders to get control of these lines, which might result in breaking up the system. It is considered for the interest of the first mortgage bondholders to have the system kept together, even at the cost of a little delay in interest. There is no doubt about the security of Richmond & Danville sixes. The bondholders will get every cent of interest due them."

## TRAFFIC.

### Chicago Traffic Matters.

CHICAGO, July 6, 1892.

The differential lines east are scrambling for business for the National Educational Association and the Society of Christian Endeavor, and the original restrictions and limits on these tickets are being quite generally removed. The Wabash now announces a round trip rate of $19 to Boston and return, in alleged retaliation because the Erie contracted for a party of delegates at this rate to the meeting of the Pharmaceutical Association.

The Commissioners of the Western Traffic Association have a session to-morrow for the hearing of appealed cases. Among other matters the question of rates on exhibits for the World's Columbian Exposition will be considered.

The "Soo" line having made an additional reduction on compressed wool from St. Paul to Boston, Chairman Midgely has authorized a corresponding reduction via Chicago, viz., to a basis of 45 cents per 100 lbs. St. Paul to Boston.

The Colorado lines are all asking for and obtaining relief against the reductions of the Rock Island, effective the 22d. There is considerable unpleasant feeling over the matter, and it would not be surprising if the Santa Fe should proceed to inaugurate reductions this side the Missouri River. If this is done, it is likely to lead to a general demoralization of all Missouri River rates.

There is little change in Lake rates, 1¾ cents for corn to Buffalo being the average.

The regular meeting of the Western Passenger Association is being held at Lake Minnetonka this week. The question of the adoption of an interchangeable 5,000-mile ticket will be considered, upon the report of the special committee.

The Wabash and Frisco lines recently appealed to the Commissioners of the Western Traffic Association from the adverse ruling of Chairman Midgley, of the Western Freight Association, upon their application to authorize Mississippi River rates on wheat for milling to Springfield, Jacksonville and intermediate points, in connection with the Jacksonville, Southeastern line, the same as in effect, by exception, via the Wabash and Alton to Litchfield, Edwardsville, Jacksonville and Springfield. The Commissioners have disallowed the appeal for the following reasons, among others: That the arrangement has long been in force at the points and over the lines by which it was authorized as an exception to the general rule; that the continuance of those rates created no disturbance in existing conditions, and opened no new divisions with outside lines, the rates in each case being through rates which involved no question of divisions or proportionate rates; that if the proposition is authorized as asked by the Jacksonville Southeastern it will take the basis through other points where it has never been opened; it will establish a precedent for its demand by other outside lines such as the Clover Leaf, the Vandalia, etc., in the general territory in question; as well as for a like demand in respect to points of corresponding distance from St. Louis south of the Vandalia, which has been established as a boundary line: its application will not unnaturally be sought by the Santa Fe southbound via Jacksonville; and it will be claimed to be inconsistent with the position assumed by the Commissioners in their effort to maintain the Peoria basis at Beardstown and other interior points west of the milling points in question. They state that the matter will be subject to reconsideration in the event of future changed conditions.

### Traffic Notes.

The Atchison, Topeka & Santa Fe and Chicago, Rock Island & Pacific have made a rate of one cent a mile from all points in Oklahoma to all points in Kansas, good from July 5 to July 14 for parties of ten or more. This is to afford relief to the Kansas farmers, who are greatly in need of immediate help to harvest their crops of wheat.

The Texas Railroad Commission has decided the case of T. C. Frost against the Galveston, Harrisburg & San Antonio. Frost complained that the road charged 75 cents per 100 pounds on wool from Del Rio to San Antonio instead of 50 cents authorized by the Commission. The Commission found the defendant road guilty of overcharge of $88.

The Interstate Commerce Commission has summoned the following railroads to an investigation beginning on July 13: The Baltimore & Ohio, the Chicago & Eastern Illinois, the Chicago & Grand Trunk, the Grand Trunk of Canada, the Cleveland, Cincinnati, Chicago & St. Louis, the Chicago & Erie, the Michigan Central, the Lake Shore & Michigan Southern, the Pennsylvania, the New York, Chicago & St. Louis, the Wabash and the Delaware, Lackawanna & Western. It is given out that the inquiry which will deal with discriminations will be very broad.

In the United States Circuit Court at Portland, Ore., last week the injunction suit brought by the Oregon Short Line and Utah Northern against the Northern Pacific was decided in favor of the defendant. The plaintiff alleged that the defendant discriminated in freight originating at points east of the 97th meridian and destined to points north of Portland. The defendant denied any discrimination, stating that it would carry all such freight from Portland to Washington points at the regular freight tariff rates. An injunction was issued restraining the defendant from further refusal. Justice Field of the United States Supreme Court dissolves the injunction on the ground that the plaintiff cannot compel the defendant to let its own cars stand idle and use the plaintiff's cars at mileage rates, and that in the matter of passengers there is no obligation on the part of either company, in the absence of specific agreement, to honor tickets issued by the other company.

GEO. WESTINGHOUSE, JR., President. T. W. WELSH, Supt. JOHN CALDWELL, Treasurer. W. W. CARD, Secretary. H. H. WESTINGHOUSE, General Manager.

# THE WESTINGHOUSE AIR BRAKE COMPANY

PITTSBURGH, PA., U. S. A.,

MANUFACTURERS OF THE

## WESTINGHOUSE AUTOMATIC BRAKE

**The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 24,000 engines and 325,000 cars. This includes (with plain brakes) 252,000 freight cars, which is about 23 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording the opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 173,000 of the Improved Quick-Action Brakes since December, 1887.**

**The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception**

| Year. | No. per year. | Grand total. |
|---|---|---|
| 1881 | 105 | 105 |
| 1882 | 1,085 | 1,190 |
| 1883 | 4,966 | 6,156 |
| 1884 | 15,051 | 21,207 |
| 1885 | 10,410 | 31,617 |
| 1886 | 8,946 | 40,563 |
| 1887 | 9,281 | 49,844 |
| 1888 | 27,696 | 77,540 |
| 1889 | 26,065 | 103,605 |
| 1890 | 50,502 | 154,107 |
| 1891 | 39,061 | 193,168 |

**193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.**

E. L. ADREON, Manager. JOHN B. GRAY, Agent. C. C. HIGHAM, General Supt.

THE

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NEW YORK OFFICE, 160 Broadway, JOHN B. GRAY, Agent.

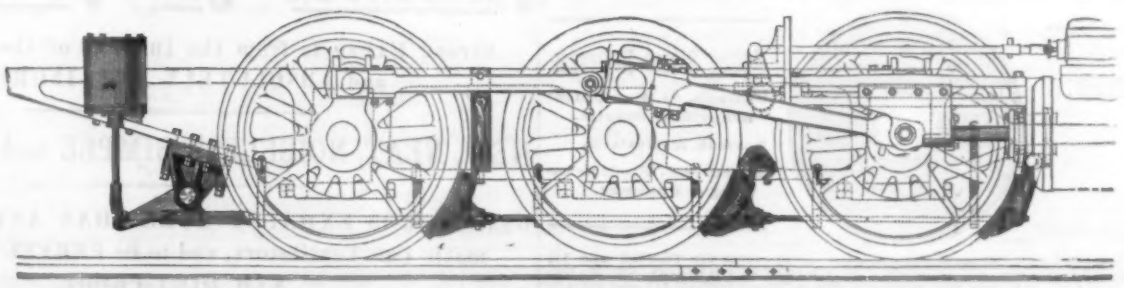
THE WESTINGHOUSE AIR BRAKE CO., Lessee,

MANUFACTURERS OF

CHICAGO OFFICE, GRAND PACIFIC HOTEL.

# LOCOMOTIVE BRAKES.

**General Offices and Shops, Second and Tyler Sts., ST. LOUIS, MO., U. S. A.**



**Standard Outside Equalized Pressure Brake,** for two or more pairs of Drivers furnished to operate with either STEAM AIR or VACUUM.

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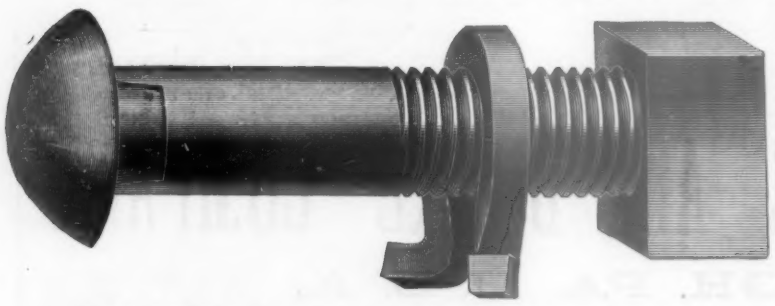

Manufactured under D. O. Ward's Patents by the

## STANDARD NUT LOCK CO.,

**NOS. 236-248 BANK ST., NEWARK, N. J.**

**SAMPLES FREE.**

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spring steel, having horizontally inclined foot pieces, which are curved inward, thereby greatly increasing the spring resistance and acting simultaneously; rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down *thread* of *bolt*.

The nut lock for ⅝ bolt made of ¼ in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, *i. e.*, the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in *inwardly curved* extensions, which must apparently furnish additional short leverage spring force of a torsional character.

**Distinctive Merits of the "Standard" Nut Lock, Condensed:**

Fixedness of position—cannot rotate and hammer down threads of bolt.

Cannot get one end into elongated slot of angle-bar.

Unlike any permanently placed, double washer, the Standard *is* interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

Being fixed in position it offers double the locking friction of nut locks, which when in their *dead* "set" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.

# THE STANDARD COMBINATION TIE PLATE AND BRACE

## POSSESSES THE FOLLOWING MERITS:

1. It prevents absolutely the canting of the rail into the tie, thereby greatly increasing the life of the tie.
2. It prevents the rails from spreading or canting over and wearing one side only.
3. The combination of the brace and plate obviates the necessity of spiking the rail and brace separately, thereby saving two spikes and securing the service of the *inside* spike for *holding* the rail; it also prevents the rail from working up and down, and laterally, thus making it impossible to wear the *neck of the spike*.
4. The plate and brace being made of malleable iron, is practically indestructible.

The tie plate and brace is especially useful for curves and guard rails, and also on bridges, whether the rail is laid on ties or on stringers. A tie plate without a brace will not save the head of the spike. A brace without a tie plate will not save the tie, and in a short time the rail will wear into the tie.

P. O. Box 288, PHILADELPHIA, PA. **WILLIAM H. PHILLIPS.**

Simple. Easily Applied. Very Effective.

# THE NATIONAL LOCK WASHER

**THE ONLY POSITIVE NUT LOCK IN COMBINATION WITH ELASTICITY.**

**Sixty Millions in Use in Railroad Track**

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**Made for all sizes of bolts.**

**A trial is requested.**

**Samples free of expense.**

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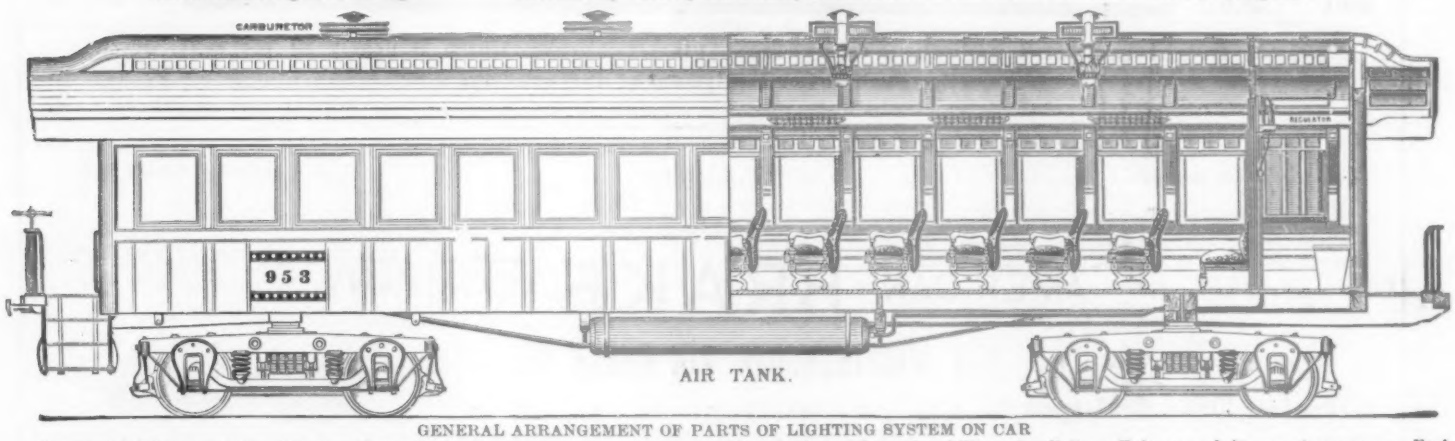
**The Greatest Light of the Age.** **Extensively Used by the Pennsylvania Railroad and the Pullman Palace Car Company.**

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RELIABLE AND UNIFORM HEAT. ECONOMICAL AND RAPID CIRCULATION.
GIBBS' AUTOMATIC COUPLER OF WESTINGHOUSE TYPE, ABSOLUTELY STEAM TIGHT.

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Gold's INTERCHANGEABLE, with Gravity Relief Trap.
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WROUGHT IRON PIPE OF SUPERIOR QUALITY.
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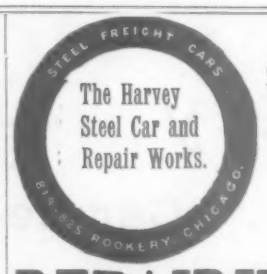

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BUILDERS OF
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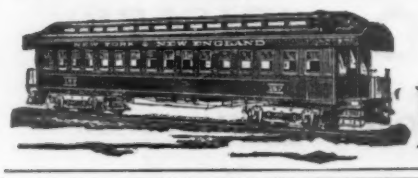

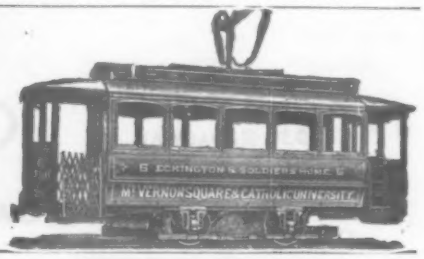


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## South Baltimore Car Works
BALTIMORE, MD.,
BUILDERS OF RAILROAD FREIGHT CARS
# ERIE CAR WORKS, Limited.
## Freight Cars of All Kinds.
Capacity, 20 CARS PER DAY. ERIE, PA.

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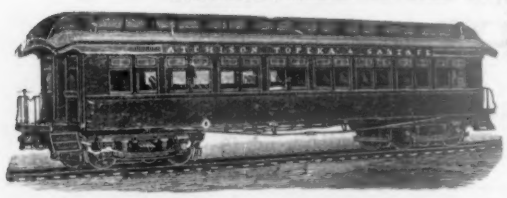
MANUFACTURERS OF CAR WHEELS, STREET AND MOTOR CARS.


PASSENGER COACHES, BAGGAGE & MAIL CARS.
Box Cars, Stock Cars, Ore Cars, Coal Cars,
Flat Cars, Logging Cars, Warehouse Trucks,
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# WASON MANUFACTURING CO., SPRINGFIELD, MASS
Established 1845.) Manufacturers of all descriptions of Railway Cars, Car and Locomotive Wheels, Frogs, Switches and Railway Castings. Employ none but Experienced Workmen, and have on hand a Large and Complete Stock of Seasoned Lumber, sufficient for several years' consumption. Special facilities for furnishing Sectional Work for Exportation.
DAILY CAPACITY, ONE PASSENGER AND SIX FREIGHT CARS. SHIPMENTS MADE FROM NEW YORK OR BOSTON.
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NEW WORKS BUILT 1872. P. O. ADDRESS, BRIGHTWOOD, MASS.

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**Licensees of the CONSOLIDATED BRAKE SHOE CO.,**

FOR OHIO AND WESTERN STATES: THE CONGDON BRAKE SHOE CO., Monadnock Building, Chicago, Ill.
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**Shoes should be ordered in accordance with the above allotment of territory.**

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## THE LEADING CAR SEAT OF THE TIMES.

*The following Popular Trains are furnished in whole or in part with our Superb Seating:*

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SPECIFY ONLY

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"Flying Statesman."
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**THE HALE & KILBURN MFG. CO.,** Philadelphia, New York, Chicago.

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FREIGHT CARS, CAR WHEELS, CAST IRON WATER AND GAS PIPE, CASTINGS AND FORGINGS.

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Solid Steel OR Malleable Iron, WITH *Steel Knuckle.*

Simplest, Strongest Best.

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Capacity, 350 WHEELS PER DAY. ERIE, PA.

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Manufacture Mail, Baggage, Box, Gondola, Flat, Gravel, Ore, Coal, Mine and Hand Cars. Patent Turn-Tables and Centres for Wooden Turn-Tables, Car Castings, Railroad Forgings, Rolling-Mill Castings, Bridge Bolts and Castings.

We have in connection with our Car Works an extensive Foundry and Machine Shop, and are prepared to do a general Machine Business.

ARIO PARDEE, Proprietor. S. B. MORGAN, Manager.

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Furnishes CREOSOTED MATERIAL of all kinds by the cargo and carload. Manufacturers of WOOD CREOSOTE OIL, the only oil used at their works in protecting timber against decay and the ravages of the seaworms. Shipping facilities unsurpassed by rail and water. Write for circular and prices. B. T. BURCHARDI, Chief Engineer and Superintendent.

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Enable railway cars to be started with but one-tenth the power required with ordinary brasses. Thirty (30) per cent. coal saving realized with trains of four or more cars. Journal heating entirely done away with by removing the cause. Cost of lubrication practically nothing, and every bearing guaranteed to yield 200,000 miles of service. Great economy and uniform reliability secured.

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## Van Dorston Cushioned Car Coupling Equipment Co.

## VAN DORSTON CUSHIONED CAR COUPLER,

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Lightest, Strongest and Best. Automatic Self-Opening and Self-Adjusting. Insures Safety to Trainmen. Independent Double-Acting Gravity Lock. No Slack Required to Uncouple.

Also the **Van Dorston Single, Double and Triple-Acting Cushioned Draught Gear.** Seventy-five per cent. reduction in shocks on the part of the couplers and car bodies, and consequent great economy in repairs. Increase in yard room of from 12 to 18 cars per 1,000. Correspondence respectfully solicited.

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# M. C. B. Standard

Automatic Freight Car Coupler.

Locomotive and Car Axles, Coupling Links and Pins.

M. C. B. Passenger Coupler.

Used in Place of Miller Hook Without Change in Platform.

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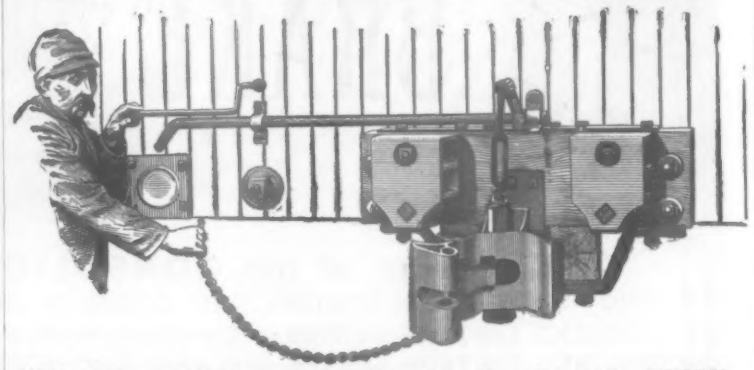
Could Continuous Platform and Buffer.

Gould Vestibule.

# STANDARD COUPLER.

(DOWLING TYPE.)

Drawhead, Malleable Iron; Knuckle, Pressed Steel; Pin, Drop Forged Steel.



With Chain Attachment for Opening the Knuckle WHEN REQUIRED.

THE STANDARD CAR COUPLING CO.,

New York Office, 45 Broadway. Chicago Office, 1018 The Rookery.

W. A. ALEXANDER, President. A. C. McCORD, Vice-President. H. O. NOURSE, Gen'l Agent. M. A. KILVERT, Sec'y. D. W. McCORD, Treas.

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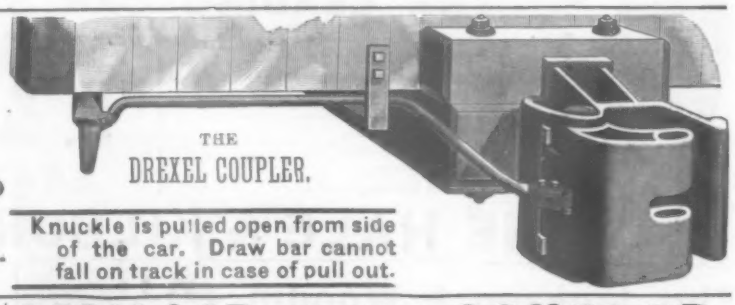
RAILWAY SUPPLY CO.

The DREXEL JOURNAL BOX LID

of Pressed Steel with a Central Bearing Spring. Cost of maintenance reduced to minimum with maximum efficiency.

The Rookery, - - - CHICAGO.

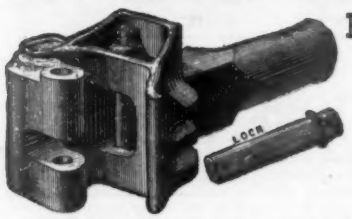
*Eastern Office: COLUMBIA BUILDING, NEW YORK.*



THE DREXEL COUPLER.

Knuckle is pulled open from side of the car. Draw bar cannot fall on track in case of pull out.

# ST. LOUIS STEEL COUPLER,



FREIGHT, PASSENGER AND TENDER COUPLERS.

ST. LOUIS CAR COUPLER CO.,

ST. LOUIS, MO.

WM. V. WOLCOTT, President. HENRY O'HARA, Vice-Prest. GEO. A. BANNANTINE, Secretary.

# SMILLIE DOUBLE LOCK COUPLER.

TENSILE STRENGTH (Fairbank's Test) 139,640. DROP TEST, 700 lbs. hammer dropped 18 ft. 22 times failed to break the knuckle.

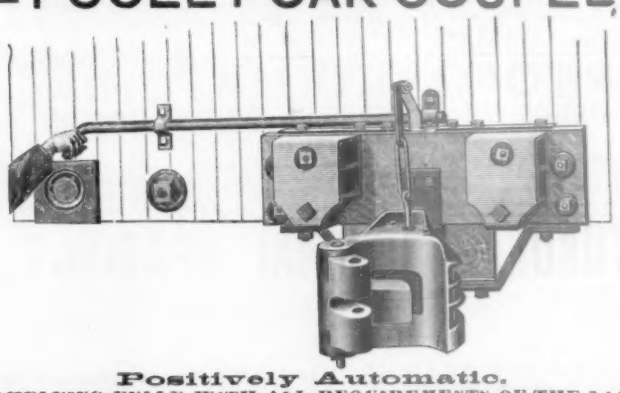
Direct drop of full sized pin makes a double lock formed by draw bar at "C" and Pin "D." Equally strong if pivot pin "A is lost. Should pin be lost, use any link—no chains being required. The strongest Knuckle and Coupler known. Cannot be unlocked by any jolt of the cars. Couples with all M. C. B. types. The locking pin drops behind the step on rear of Knuckle "K," and keeps the knuckle always open when cars are separated. Removing the pivot pins, 33 loaded gondola cars were drawn from Paterson, N. J., to West End (18 miles), the pull being entirely on the DOUBLE LOCK.

The drawbar is Malleable Iron. The Knuckle Pivot and Locking Pins steel.

THE SMILLIE COUPLER & MFG. CO.,

52 Broadway, New York. Works, 91 Clay St. Newark, N. J

# THE POOLEY CAR COUPLER.



Positively Automatic.

COMPLYING FULLY WITH ALL REQUIREMENTS OF THE LAW.

*SIMPLE STRONG. EFFECTIVE*

PRATT & LETCHWORTH, MANUFACTURERS, BUFFALO, N. Y.

# TROJAN CAR COUPLER.

M. C. B. TYPE.

*THE STRONGEST AND THE ONLY SAFETY COUPLER.*

The knuckle may be thrown open for coupling by the hand-rod at the side of the car, rendering it unnecessary for trainmen to go between the cars to open the knuckle. The action is positive, and not dependent on springs or gravity.

The lock has a bearing of four square inches on the knuckle.

N. O. Olsen, Engineer of Fairbanks & Co.'s testing department, says: "IT IS THE STRONGEST COUPLER NOW IN THE MARKET

THE TROJAN CAR COUPLER CO.,

New York Office, 11 Pine street. TROY, N. Y.

See the other ad.:

McGILL

THE VERTICAL PLANE MUST GO

SETTLES THE QUESTION.

# Worlds Fair

Freight Passenger CAR McGILL IRON WORKS CO PEORIA, ILL.

# Couplers.

PASSENGER, FREIGHT, TENDER.

# HINSON COUPLERS

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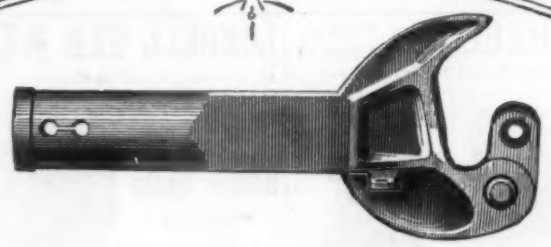
# THE JANNEY FREIGHT CAR COUPLER



THE McCONWAY & TORLEY CO.

W. McCONWAY,

PRESIDENT.

48th ST. & A. V. R. R. PITTSBURGH, PA.

Agents & Manufacturers For

THE JANNEY-HIEN COMPANY

# THE BUCKEYE COUPLER.

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Master Car Builders' Standard in every particular. Combines the greatest obtainable strength and simplicity. Only Three Parts. Positive acting gravity lock and positive mechanical opening of knuckle. Absolute Central draft. Same movement that raises the lock throws open the knuckle.

Adop ed as Standard by Several Leading Railroads After S.vere Tests and Long Trials.

*Sold with a GUARANTEE to Stand the Proposed M. C. B. Drop and Pulling Tests.*

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Phenix Building, CHICAGO, ILL.

THE BUCKEYE AUTOMATIC CAR COUPLER CO., Columbus, Ohio.

# JOHNSTON CAR COUPLING COMPANY

204 WALNUT PLACE, PHILADELPHIA, PA.

The Lightest, Simplest and Least Expensive Coupler in the Market.

WEIGHT 180 POUNDS.

MEETS ALL THE REQUIREMENTS OF THE M. C. B. LINES AND TESTS.

LOCKING DEVICE SIMPLE, DURABLE AND EFFECTIVE

*It Has but Four Parts and Cannot Be Opened by Accident.*

KNUCKLE OPENS AUTOMATICALLY

# THE BALTIMORE CAR WHEEL COMPANY

MANUFACTURERS OF

CHILLED WHEELS OF ALL PATTERNS AND SIZES FOR EVERY SERVICE, AND WITH OR WITHOUT AXLES.

CAPACITY, 400 WHEELS PER DAY.

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OFFICE AND WORKS: Fulton Junction, Baltimore, Md.

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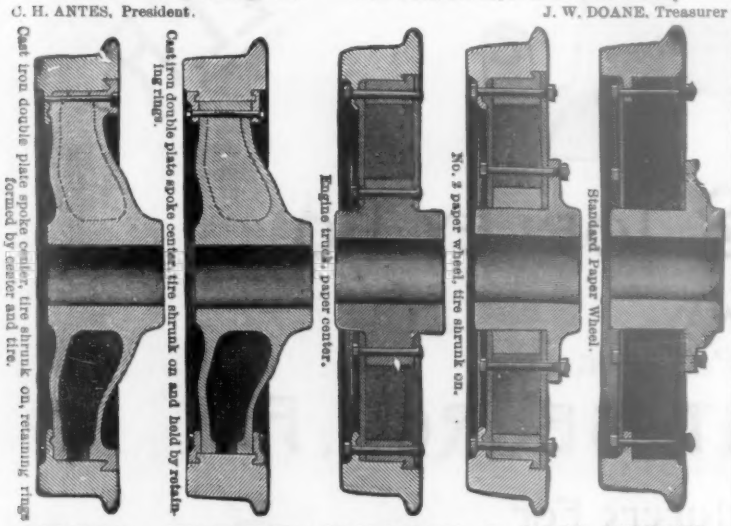
Works, Hudson, N. Y. **ALLEN PAPER CAR WHEEL CO.** Works, Pullman, Ill.
General Office, Chicago. Ill. New York Office, 31 and 33 Broadway.
C. H. ANTES, President. J. W. DOANE, Treasurer


Cast iron double plate spoke center, tire shrunk on, retaining rings formed by center and tire.
Cast iron double plate spoke center, tire shrunk on and held by retaining rings.
Engine truck, paper center.
No. 2 paper wheel, tire shrunk on.
Standard Paper Wheel.

**STEEL-TIRED WHEELS** FOR CAR, LOCOMOTIVE AND TENDER TRUCKS

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**DICKSON CAR WHEEL CO.,**
Manufacturers of all Sizes of ENGINE, TENDER and

**CAR WHEELS,**

In either the COMMON or
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from the celebrated TEXAS CAR-WHEEL IRON. All wheels subject to M. C. B. drop test, "BARR" wheels are ground smooth and true, and the 33-inch guaranteed to run 70,000 miles.
ANNUAL CAPACITY, 50,000 WHEELS.
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**LOBDELL CAR WHEEL CO., WILMINGTON, DEL.**
Established 1836.

Double Plate, Single Plate AN Hollow Spoke WHEELS FOR Broad and Narrow-Gauge Cars Engines and Tenders.

Also OPEN AND Solid Plate STREET CAR WHEELS Either in the Rough or Fitted on Axles.

CAPACITY, 500 WHEELS PER DAY.

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**TAYLOR IRON & STEEL CO.**
SUCCESSORS TO "THE TAYLOR IRON WORKS,"
HIGH BRIDGE, NEW JERSEY, on line of C. R. R. of N. J.
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# STEEL-TIRED WHEELS

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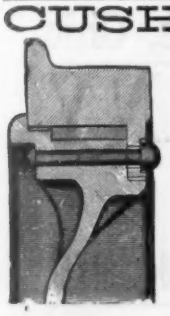
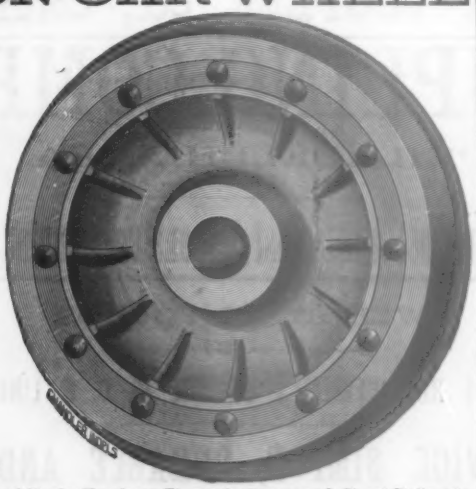
**CUSHION CAR WHEEL**



RECORD 40,000 MILES, 1-16 INCH WEAR.



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Economy.
Elasticity.
Safety.
Noiseless.

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SEND FOR CIRCULAR.
**CUSHION CAR WHEEL CO.** {INDIANAPOLIS, IND., and GRAND PACIFIC HOTEL, CHICAGO.

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The **MIDVALE STEEL CO.**
FORGINGS CASTINGS

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**THE WASHBURN CAR-WHEEL COMPANY**

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**CRUCIBLE STEEL-TIRED WHEELS,**

For Parlor and Sleeping Cars, Passenger Coaches, Locomotive and Tender Trucks.

**CAST-IRON CENTRES**

WELDED TO

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**THE CAYUTA WHEEL AND FOUNDRY CO AND SAYRE STEAM FORGE**

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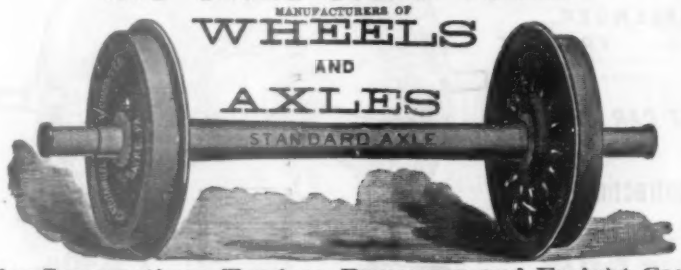


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RAILROAD CASTINGS AND HEAVY FORGINGS.

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ELECTRIC and CABLE STREET RAILWAYS.

IN SUCCESSFUL USE ON 48 ROADS.

PATENTED IN UNITED STATES AND EUROPE.

By its use the rail is made as strong at the joint as it is at the centre of the rail as it lies in track.

It is simple and easily applied, and has always given satisfactory results.

It is the safest joint to use, and cheaper in the long run than the angle bar.

It will increase the life of the rail over 25 per cent.

**CONTINUOUS RAIL JOINT COMPANY OF AMERICA,**

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**HIGH GRADE CHILLED CAR WHEELS**

ALL WHEELS GUARANTEED TO STAND PROOF

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Wood-Wheel Hand and Push

**CARS**

WITH ROLLED STEEL TIRE.

RAILWAY SUPPLIES

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LOCOMOTIVE CASTINGS, SUCH AS DRIVING BOXES, CROSS HEADS, ROCKER SHAFTS, PISTONS, FOLLOWERS, etc.

BRAKE SHOES, CAR COUPLERS, DRAW-BARS, ETC.

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**INSURANCE COMPANY**

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ESTABLISHED 1845.

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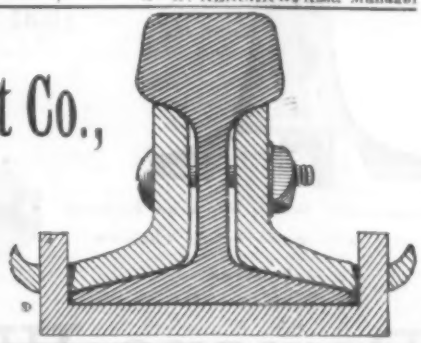
**Eno Rail Joint Co.,**

**NEWARK, N. J.**



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*Simple. Compact. Effective.*

Piston of Air Brake Cylinder is automatically kept at any desired uniform stroke, resulting in full, effective piston pressure at all times.

ONE ADJUSTER PER CAR.

Uniformly applicable to any form of brake rigging, Passenger or Freight, whether brakebeams are outside or inside hung, etc., etc.

Illustrated Catalogue, with records of performance in service, upon application.

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(FOR DESCRIPTION SEE RAILROAD GAZETTE OF DEC. 18, 1891)

**THE MOST ECONOMICAL. ABSOLUTE SAFETY.**

HIGH RATE OF SPEED WITHOUT ANY JAR.

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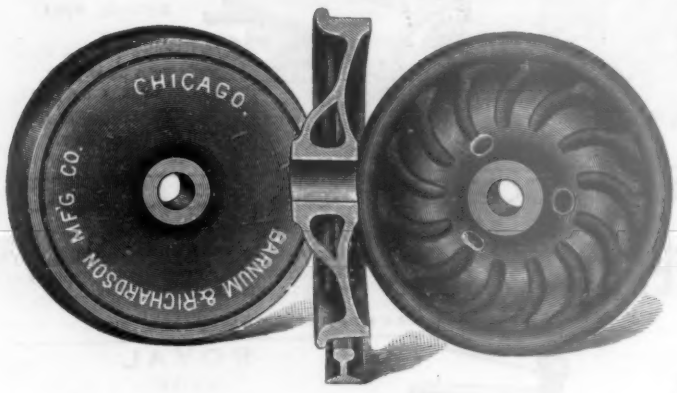


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—AND—

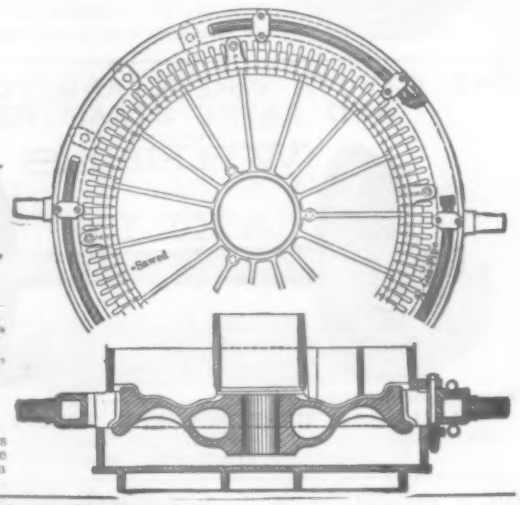
*STREET CAR WHEELS,*

IN THE

Bar Contracting Chills.

Salisbury Charcoal Pig Iron, Street Railway Curves, Crossings, Frogs and Switches.

Machinery and Heavy Castings of all descriptions. Wheels are made perfectly cylindrical, uniform in chill, and with treads ground.



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HILLBURN ROCKLAND COUNTY, N. Y.

MANUFACTURERS OF

Switches, Automatic Safety Switch Stands, Yoked Frogs
Bolted Plate and Spring Rail Frogs, Automatic
Distant Signals Interlocked with Switches,
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LIGHT AND HEAVY CASTINGS AND GENERAL TRACK EQUIPMENT

Automatic Stand, Showing Position of Parts while being Thrown by Hand

Automatic Stand, Showing Position of Parts while being Thrown Automatically by Train.

"RAMAPO YOKED FROG."

# Ramapo Wheel & Foundry Company

MANUFACTURE

CHILLED IRON CAR WHEELS

FROM SPECIAL QUALITY CHARCOAL IRON

FOR

Drawing Room and Sleeping Coaches, Locomotives, Tenders and Passenger and Freight Cars.

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BRAKE SHOES
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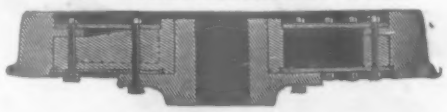

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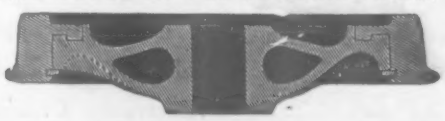

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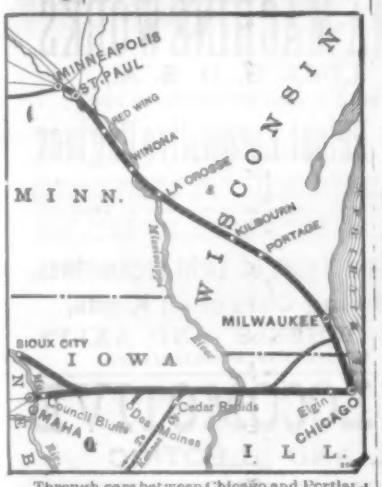


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On Sunday, May 22d, the Wisconsin Central Lines will resume its popular train service between Chicago, Waukesha and the Lake Region. Trains will leave the Grand Centaal Passenger Station, for Lake Villa (Fox Lake), Antioch, Mukwonago and Waukesha at 8:30 A. M., Sunday, arriving at Lake Villa 10:33 A. M., Antioch 10:40 A. M., Mukwonago 11:40 A. M. and Waukesha 11:49 A. M. Returning leave Waukesha 4:45 P. M., Mukwonago 5:05 P. M., Antioch 6:18 P. M., Lake Villa 6:30 P. M., arriving at Chicago 8:45 P. M. For the accommodation of excursionists desiring to remain in the country over Sunday "The Business Man's Special" will again be placed in service. This train will leave Waukesha at 5:30 A. M., arriving at Chicago at 8:50 A. M. For tickets, time tables and pamphlets apply to GEO. K. THOMPSON, City Passenger & Ticket Agent, Chicago, Ill. Or to JAS. C. POND, General Passenger & Ticket Agent, Chicago, Ill.

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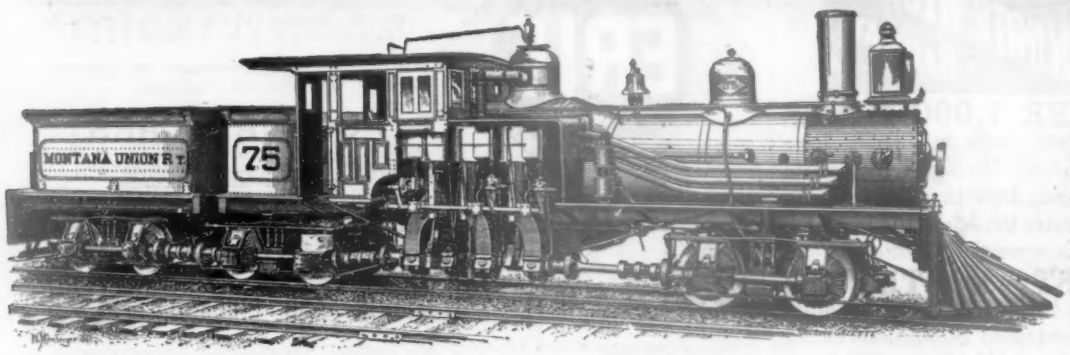


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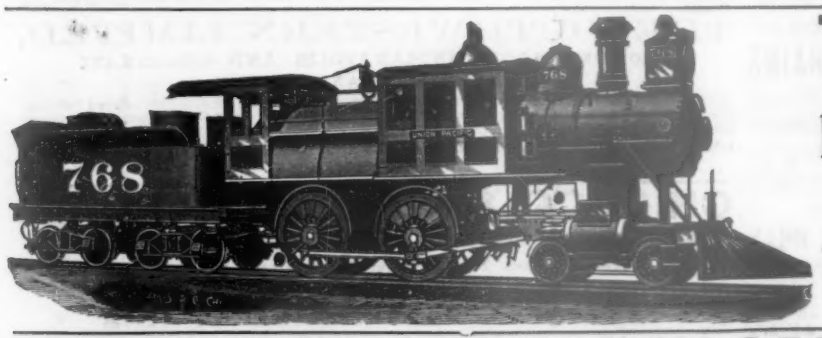


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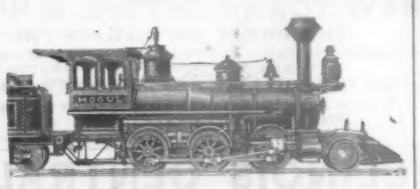


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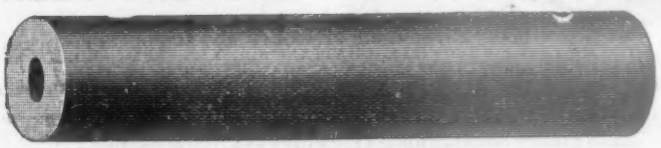

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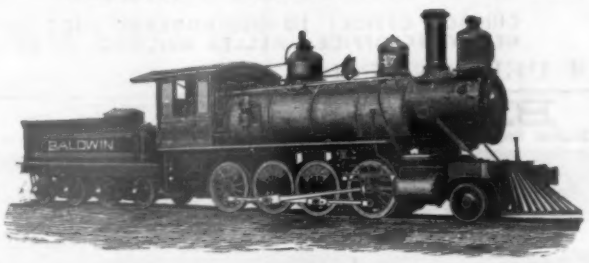


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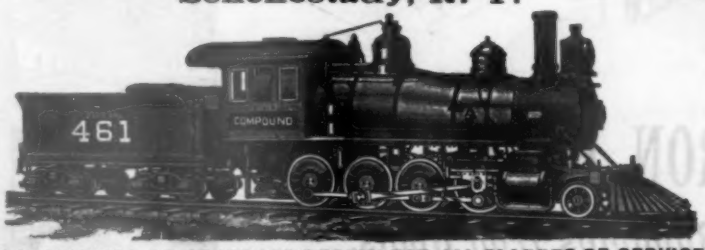


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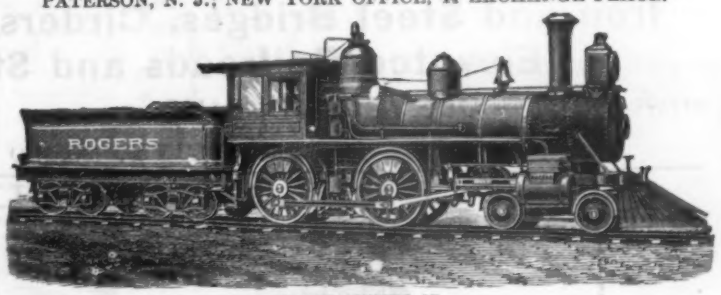


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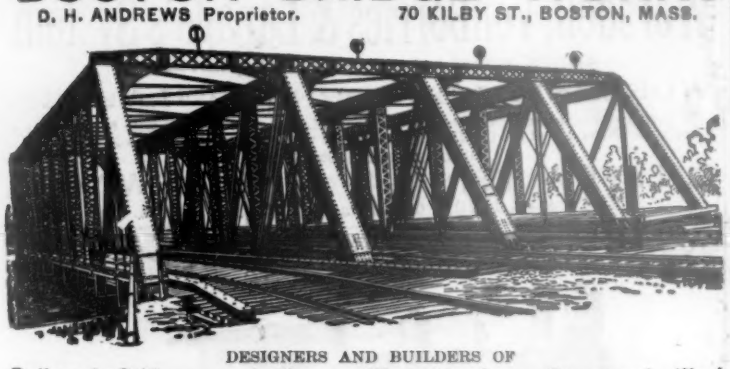

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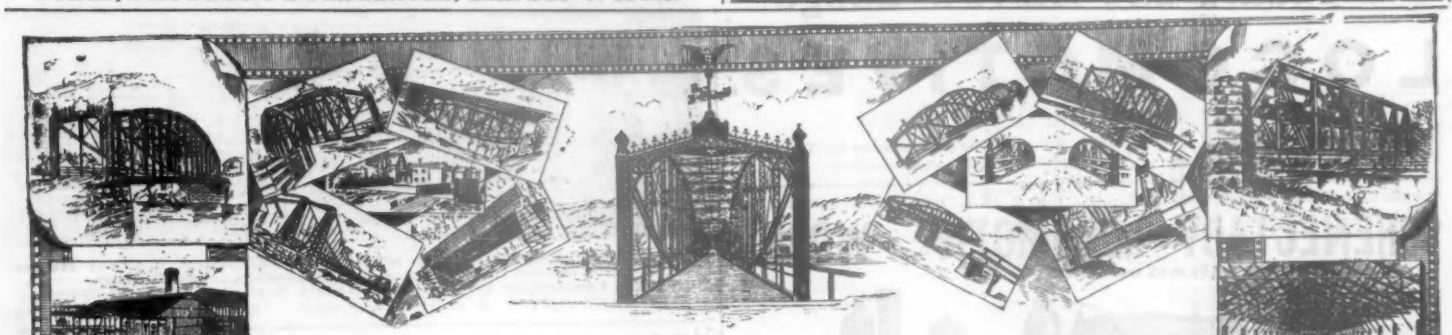

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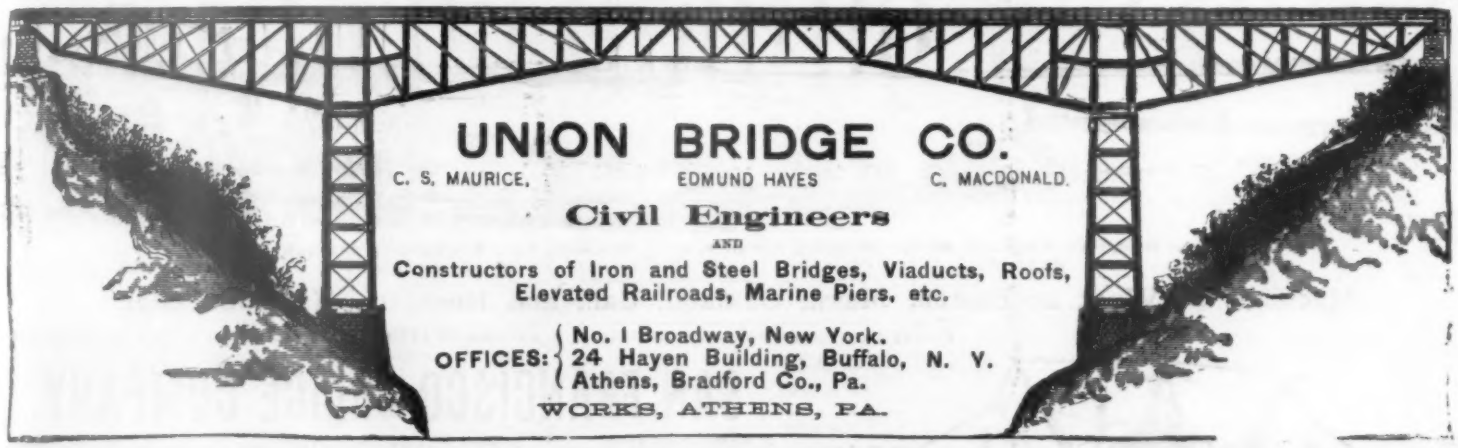

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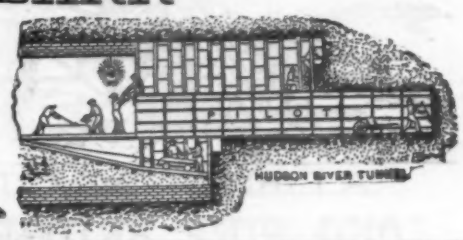

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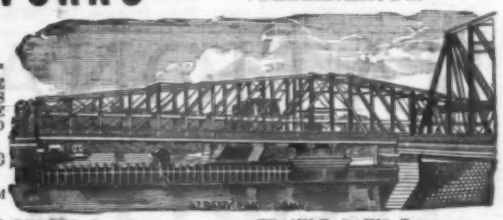

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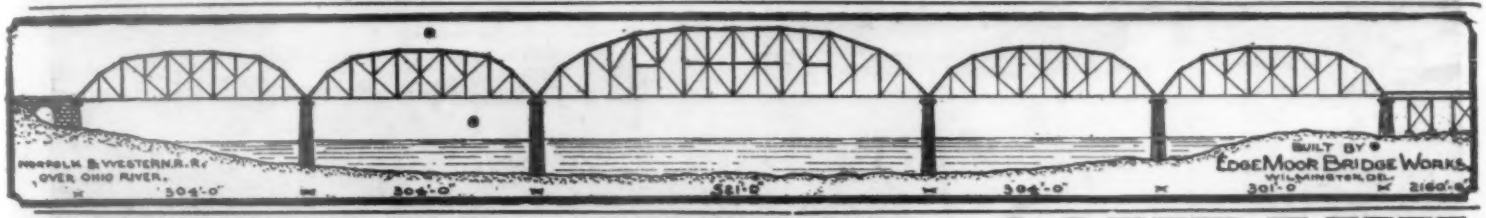


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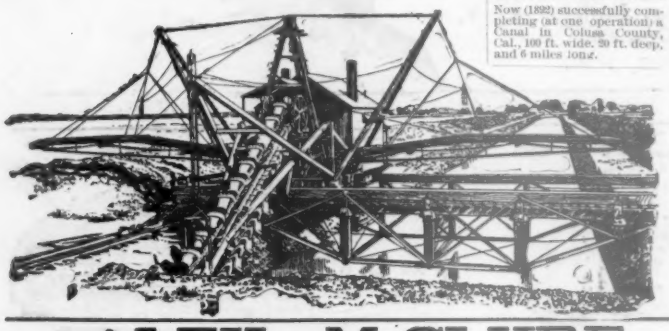

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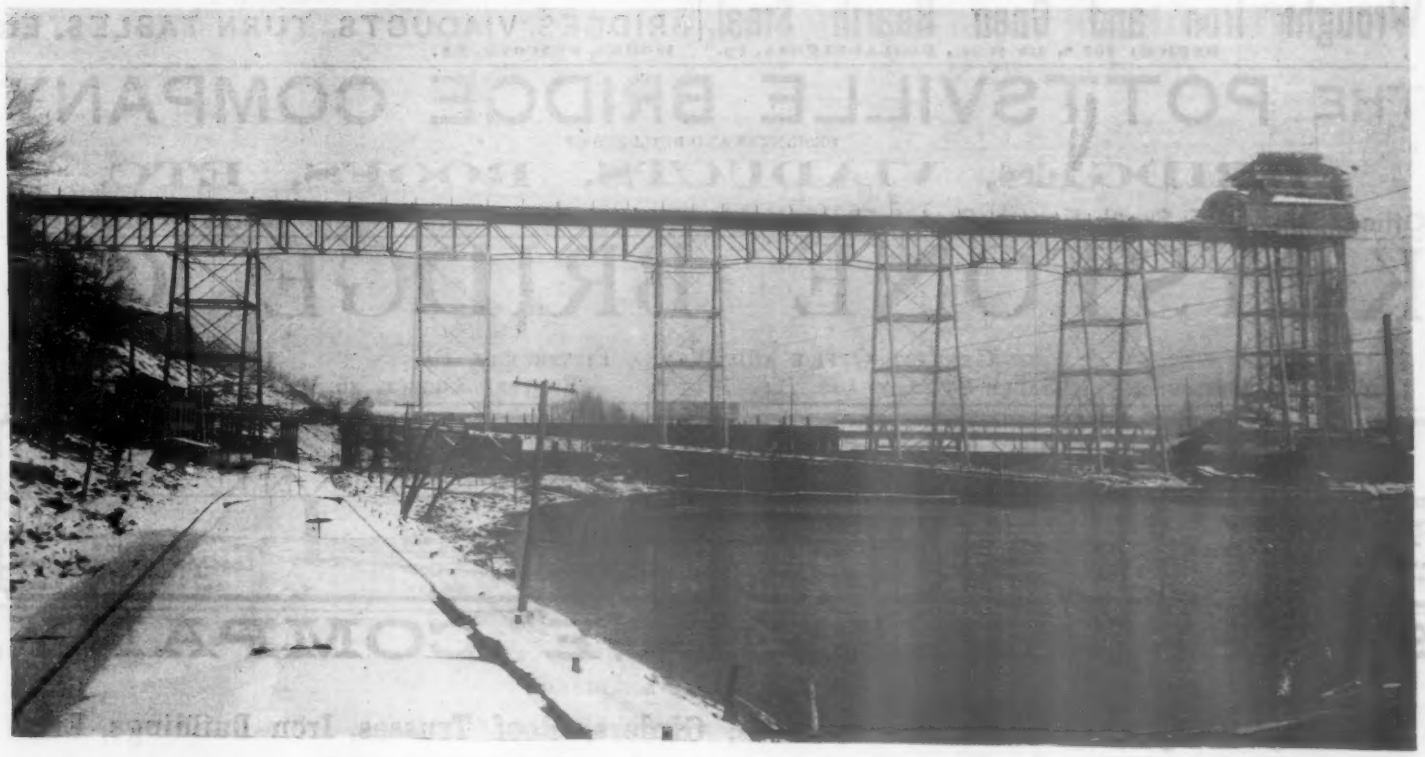

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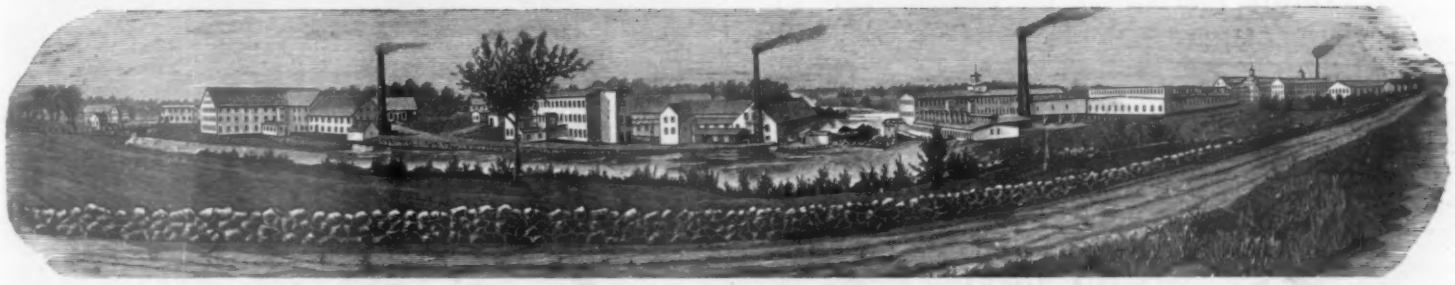

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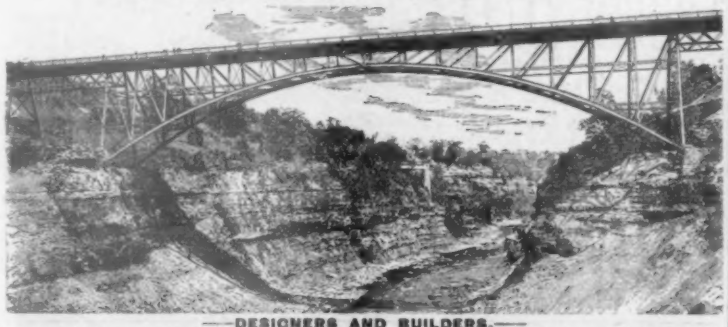

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